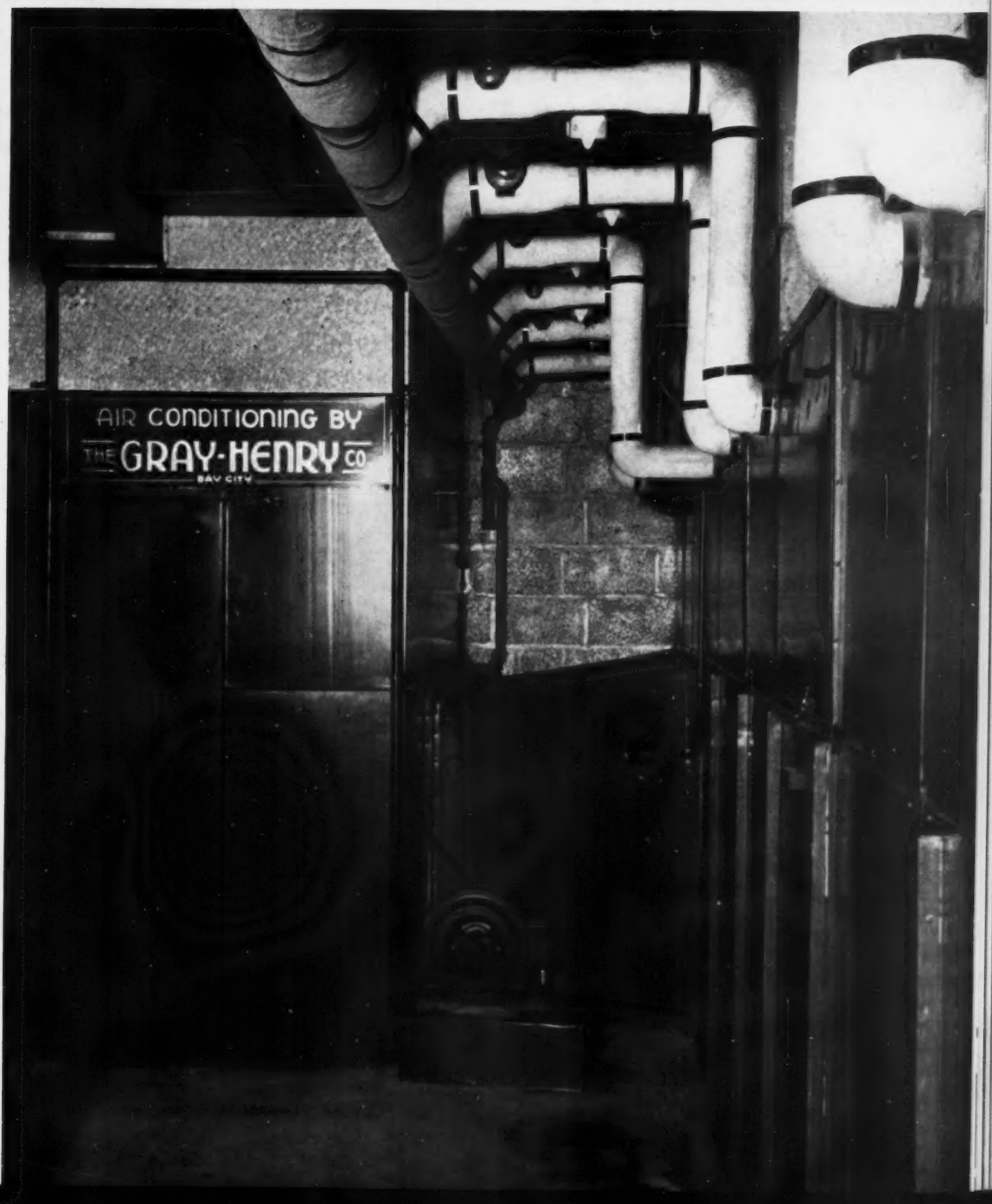
# AMERICAN ARTISAN

RESIDENTIAL AIR CONDITIONING
'ARM AIR HEATING • SHEET METAL CONTRACTING




NOVEMBER
1939

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# LAMNECK SERIES 700 SYSTEM PREFABRICATED DUCT AND FITTINGS

## *Cuts* INSTALLATION COST TO THE BONE

• An outstanding feature of Lamneck Series 700 System is its amazingly simple method of assembly which *cuts installation cost to the bone.* The duct and stack are assembled by simply slipping the two sections together at the seams, then placing a special Duct Connection over the end which snaps into place and locks the joint securely.

In the same way additional lengths are snapped into place on the other end of the Connection and the resulting assembly is leak-tight, rigid and substantial. There's no laborious fitting, no setting or forming of seams, no notching of duct, stack or fittings. The whole operation is done quicker than it takes to describe it. The consequent reduction in labor cost produces unbelievable savings and possibilities for increased profit.

• • •

With greatly speeded up assembly, Series 700 System combines standardization on far less parts. Yet it is so much more flexible than any other system yet produced that a far wider and more diversified range of installations can be taken care of.

**FEWER PARTS**
**LESS CUTTING**
**EASIER ASSEMBLY**

Here's another important saving. Far less cutting of duct work is required and the small amount still necessary is so simple that any one can do it with ease and a minimum of waste.

Get the whole story of the money-making possibilities of Series 700 System for you. Write for LAMNECK SERIES 700 CATALOG. This interesting book has been specially prepared to help you to bigger profits.

LP INC.

## LAMNECK PRODUCTS, INC.

**414 DUBLIN AVENUE • COLUMBUS, OHIO**

PREFABRICATED DUCT AND FITTINGS FOR ALL TYPES OF RESIDENTIAL WARM AIR HEATING AND AIR CONDITIONING SYSTEMS

# *With Lochinvar - you can reach this profitable volume market!*

Lochinvar

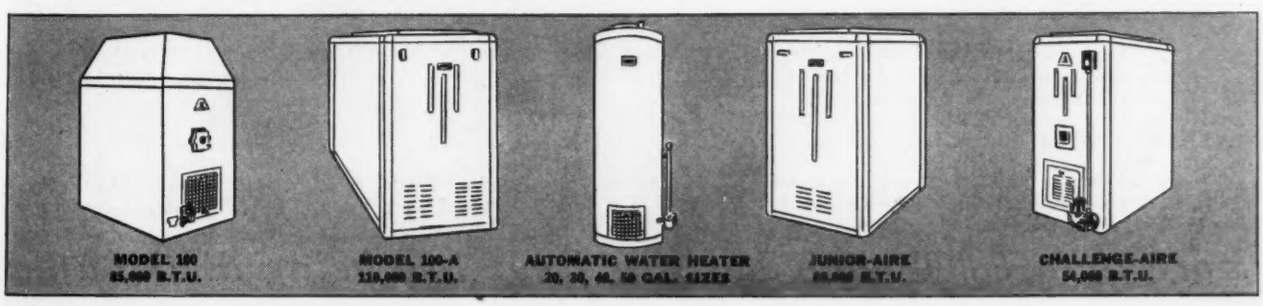
BECAUSE the Lochinvar automatic oil-burning furnaces and water heaters are designed, engineered and priced for the volume market, they are the greatest dollar-for-dollar value offered buyers of heating equipment—and dealers who have taken on the Lochinvar line have been able to reach this profitable market with less sales effort. Lochinvar has always recognized the fact that the buyer of the moderate-priced home demands as much of his heating units as the buyer of a home that costs five times as much. Therefore, it is important that each Lochinvar unit made meets the exacting requirements of this market. It is through this concentration in the low-price market that Lochinvar has become the leader in the low-price field.

If you want to realize greater profits in this market, we will gladly send you complete information and prices.

ALL UNITS LISTED AS STANDARD BY UNDERWRITERS LABORATORIES

## LOCHINVAR CORPORATION

14247 TIREMAN AVENUE • DEARBORN, MICHIGAN



# AMERICAN ARTISAN

WITH WHICH ARE MERGED

FURNACES AND SHEET METALS

AND

Warm-Air Heating

Covering All Activities in Residential Air Conditioning and Small Commercial Cooling, Warm Air Heating, Sheet Metal Contracting and Fabricating

J. D. Wilder, Editor — A. A. Kennedy, Assistant Editor

Vol. 108, No. 11 — November, 1939 — Founded 1880

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## *In This Issue*

THIS month's cover illustration is taken from photographs submitted for the article describing the ten-zone, indirect-fired, air conditioning system in the Bay City, Mich., clinic. The photograph shows the plenum chamber at the right and the blower housing in the rear. The interesting installation is described and fully illustrated on page 29.

•

One of the most practical merchandising articles published in a long time appears on page 64. Although the contractor is in Cheyenne, Wyoming, the methods he uses and the sales ideas he proposes do credit to the biggest city sales force. His record forms, to our mind, are unusually good.

•

S. Konzo, on page 36, gives us part 2 of his short series on control hookups for automatic firing. This articles describes the control system the Research Residence staff has found best for intermittent fan operation—in other words the system we all seem to favor.

•

The University of Illinois Air Conditioning Conference paper on building insulation (page 39) seems to be attractive to readers, judging from comments received. We believe that the Appendix which shows the theoretical "reasons why" are particularly valuable.

•

Not long ago we visited the fabricating plant of the Riester and Thesmacher Co., Cleveland, and followed a beverage dispensing cabinet through all the steps of manufacture. The stainless steel top, produced without any die work, saved the customer thousands of dollars in die cost. We describe the methods on page 50.

•

The ventilating system in the Harrison, N. Y. school (page 54) has no single, big duct system. Instead 30 separate, small systems are used, many powered with gravity and fan roof ventilators.

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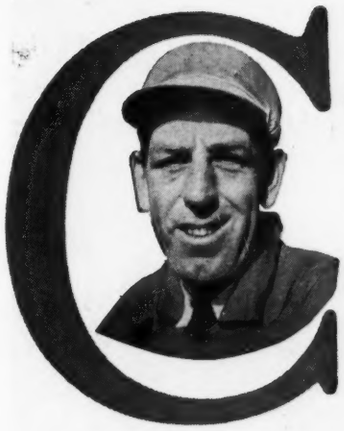


# Coffee and Coffee Cake!

*By* **TIM SHEARS**

A COUPLE of guys were out sailing one day, when their boat turns turtle in a gust of wind. They manage to scramble up on the hull, and there they stick all night. Next morning the water's smooth as silk, and the cool, fresh air smells good.

Suddenly one guy turns to the other. "Oh, boy," says he, "could I go some breakfast!" "Well," comes back his side kick, who looks pretty hungry himself, "you ain't the only one." And then he gets an idea. "Heck," he adds, "if we had some coffee we could have coffee and coffee cake...if we only had some coffee cake!"

Coffee and coffee cake would have looked mighty good to them fellers. And the coffee roasting and bakery jobs I'm inspecting a day or so ago would have looked mighty good to any sheet metal man. Cast your eyes on them in the pictures below.

Both of these jobs were made in Monel. The ventilating duct is on the roof top of the Eppens Smith coffee roasting plant at 103 Warren St., New York City. It was put up about eight years ago...16 gauge Monel sheet, gas welded and riveted construction.

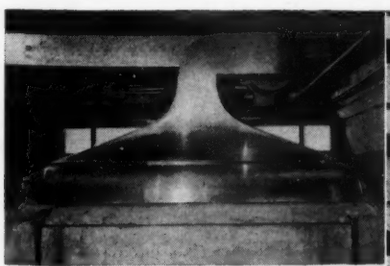
The other job is an oven hood in an upstate New York bakery. The contractor that landed this job is J. R. White and Sons of Schenectady. An' a swell piece of work they turned out!

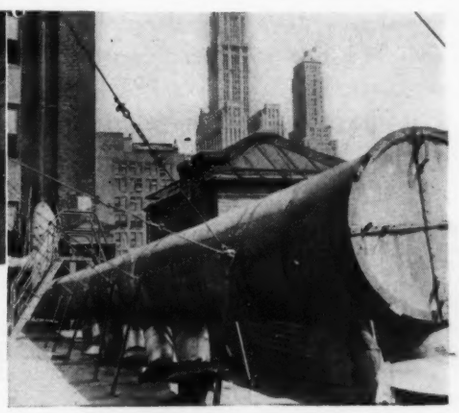
How come they call for Monel in coffee roasting plants and bakeries? For the same reason that cracker, cookie and candy makers want it. Monel gives all of these people two big advantages that other metals don't. First: Monel is strong and tough, and it doesn't rust and corrode. So equipment made of Monel is good for a long, long time...and no trouble. Second, and even more important to people like I'm talking about: Coffee fumes, steam and cooking fats don't do Monel any harm...it's easy to keep clean and sanitary. So food stuffs are safe...no danger of contamination.

All of which adds up to *profits*... for any sheet metal man who's made himself a name for handling Monel.

Don't forget that bakeries and such aren't the only places where you'll find jobs that call for Monel. There are hundreds of others, too. There's too many uses to mention here. Just drop me a line and ask for "400 Practical Applications for Monel, Nickel and Inconel." I'll see that you get it pronto.

*Keep your eyes Peeled*
*for jobs that Pay,*
TIM SHEARS



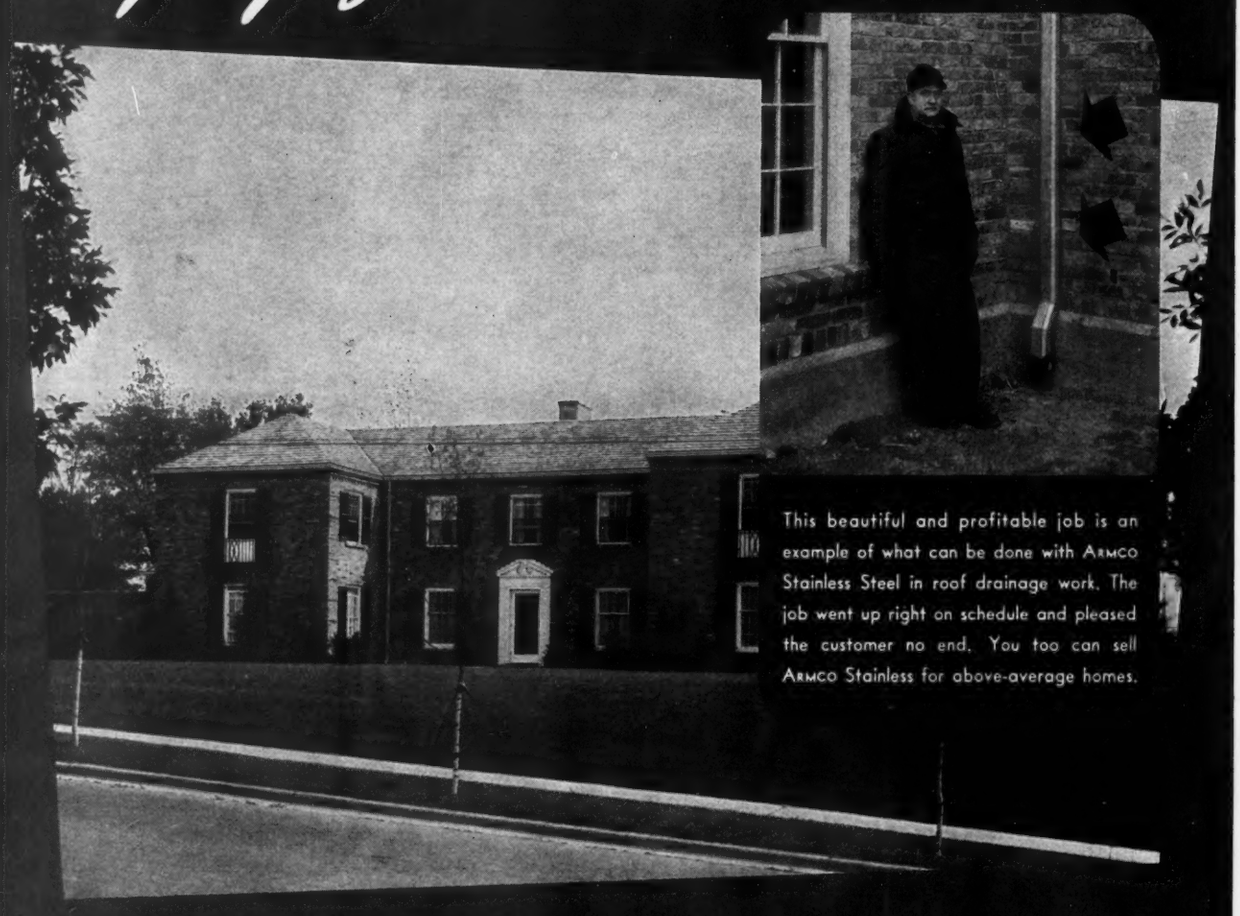


*This Monel hood over a baking oven is simple to make, and profitable, and so is the ventilating duct at right. It's made of Monel to withstand the effects of weather from the outside and coffee fumes inside.*


**THE INTERNATIONAL NICKEL COMPANY, INC.**
**67 Wall Street** **New York, N. Y.**

"Monel" is a registered trade-mark of The International Nickel Company, Inc., which is applied to a nickel alloy containing approximately two-thirds nickel and one-third copper.

# "I'm going after more Stainless Jobs...



This beautiful and profitable job is an example of what can be done with ARMCO Stainless Steel in roof drainage work. The job went up right on schedule and pleased the customer no end. You too can sell ARMCO Stainless for above-average homes.

## they're money-makers and they stay sold!"

Stainless steel has a mighty bright future in roof drainage work. Many contractors are learning this from actual experience. Among them is a well-known Southern Ohio contractor. Here's what he has to say about a roof drainage job on which he used more than 800 pounds of 28-gage ARMCO 17-7 Stainless Steel...

"The ARMCO Stainless worked fine, as easily as 26-gage iron. It was also easy to solder. We were careful not to get our irons too hot, and used a special stainless flux and 50-50 type solder. The result was as neat and strong a job as we've ever done.

"We bought the downspouts and elbows already formed. Gutters, canopies, valleys and flashing we made ourselves. The gutters hang straight and there's no sagging between joints. We're proud of the whole job, and expect to do many more like it. The owners are pleased, and you can bet they'll talk up stainless steel roof drainage to their friends."

He's right! Buyers do like stainless. They like its beautiful appearance and freedom from upkeep. You too can sell profitable jobs with stainless. For prices and "how-to-use-it" information, just call the nearby ARMCO distributor, or write direct to us. The American Rolling Mill Co., 1961 Curtis St., Middletown, O.

**ARMCO** ARMCO *Stainless Steels*

# USE H&C No. 86 REGISTERS..
## And One Job Will Sell Another!

## IT'S *Results* THAT COUNT

and with no other register can you duplicate the results obtained with No. 86—for no other register has this

**TURNING BLADE VALVE**

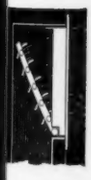


*Fig. 1*
Position of shutters with regulator set for 20° upward deflection.

*Fig. 2*
Position of shutters with regulator set for 20° downward deflection.

*Fig. 3*
Position of shutters with regulator set for horizontal air flow.

*Fig. 4*
Air flow with conventional register.

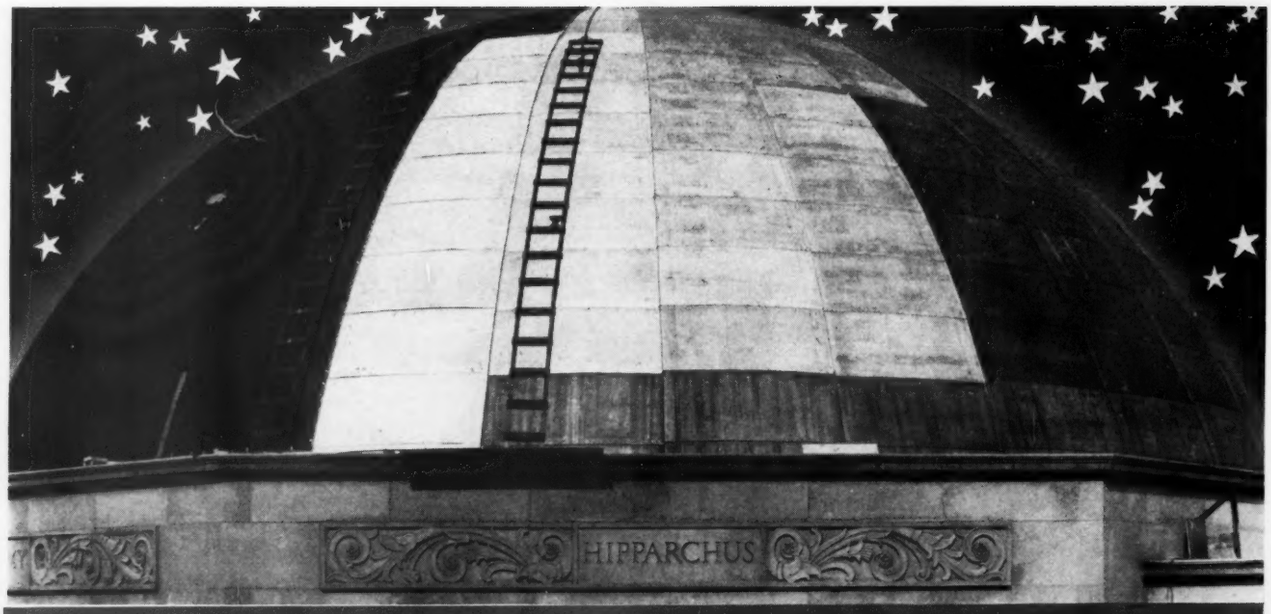
The blades of this remarkable valve, when open, extend the full depth of the average stackhead and smoothly turn every bit of the air, distributing it with uniform velocity through all portions of the register face. (See Figures 1, 2 and 3). Thus the turbulence which otherwise is built up at the top of the stackhead (see Figure 4) positively is eliminated, noise is avoided, resistance greatly reduced and the air flow is positively controlled as desired.

These definite advantages, obtainable only with the H & C No. 86 Design, together with the instant adjustability of this register to any desired deflections, both horizontally and vertically, are productive of outstandingly satisfactory results—the kind your customers will enthuse over. And customers of that nature are bound to be your best salesmen. Use No. 86 Registers and one job will sell another.

SEE OUR EXHIBIT AT THE

6th International Heating and Ventilating Exposition
Cleveland, Ohio January 22-26, 1940

**HART & COOLEY MANUFACTURING CO**
FACTORY AND ENGINEERING SALES OFFICE:
HOLLAND (H&C) MICHIGAN
Chicago Office: 61 W. Kinzie St. Philadelphia Office: 1600 Arch St.
Warm Air Registers • Air Conditioning Grilles • Damper Regulator Sets • Dampers • Chain • Pulle




# America's Fifth Planetarium will be properly protected with

# HUSSEY COPPER DOME

Donated by the Buhl Foundation as a memorial to Henry Buhl, Pittsburgh merchant and philanthropist, this splendid, million-dollar copper-domed Planetarium and Institute of Popular Science has been built to mirror the movements of the mysterious universe to residents of Pittsburgh for generations to come.

Resplendent with age-defying Hussey Pure Lake Copper, the 75 foot external dome is a tribute to the enduring qualities of Hussey Copper and to the ingenious skill of the artisans who fabricated and installed the planetarium dome.

Well-stocked Hussey warehouses in seven of the largest industrial centers, provide a quick, dependable source of supply for your every copper need.

Hussey 24-ounce copper sheets were used with standing seams running vertically. Seams were capped with a special tapered rib of 32-ounce Hussey copper. Sheets cleated and double-locked along horizontal seams.

**C. G. HUSSEY & COMPANY**
(Division of Copper Range Co.)
Rolling Mills and General Offices: PITTSBURGH, PA.

Copper **HUSSEY** Brass

# RECYCLING *Does it!*

MH

THE *Symbol* OF THE NEW AUTOMATIC HEATING

# *Two Chances* ARE BETTER THAN ONE

MINNEAPOLIS-HONEYWELL Recycling Protecto-Relays give your burner another chance to start should the flame or ignition fail in the first attempt. This eliminates the expense of many service calls. The exclusive Minneapolis-Honeywell recycling feature is made possible by the Series 10 Circuit, which also enables Minneapolis-Honeywell thermostats to operate on the heat acceleration principle. Complete Minneapolis-Honeywell equipment is an assurance of oil burner satisfaction. It provides maximum comfort, convenience and economy for your customers and minimum service calls for you. Dependable controls cost less than service. Depend on the controls bearing the Minneapolis-Honeywell symbol. Minneapolis-Honeywell Regulator Company, 2726 Fourth Avenue South, Minneapolis, Minn. Branch and distributing offices in principal cities.

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The large and complete stocks of Ryerson Certified Steels offer you the widest selection of products—products that represent the highest quality in each class of material. All Ryerson sheets (there are more than 25 different kinds) are of uniform high quality and assure excellent workability. They are all prime quality, carefully selected for finish, flatness, gauge and size accuracy. No seconds are ever carried. Ryerson stocks also include bars, angles, channels, rivets, welding rods, etc.

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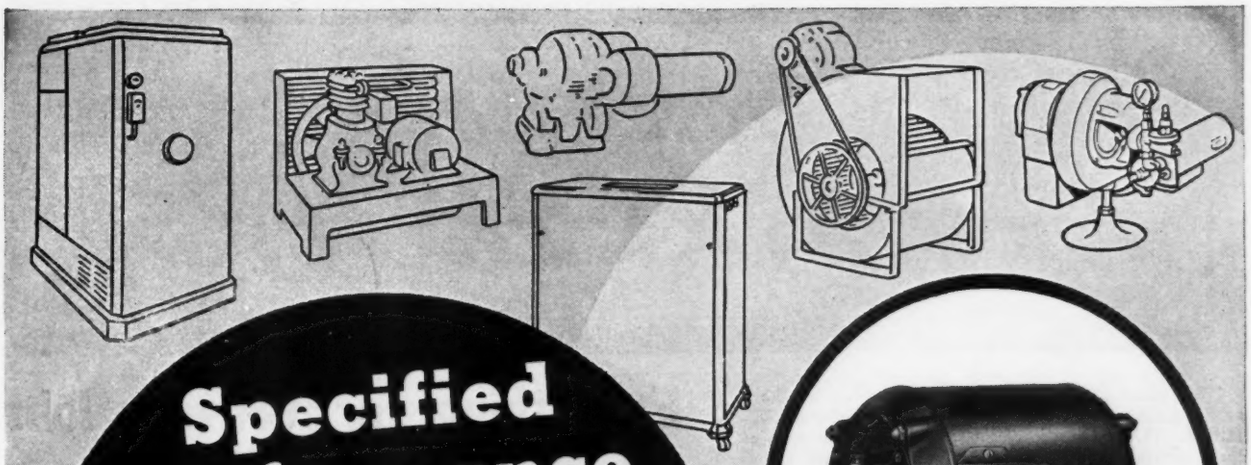
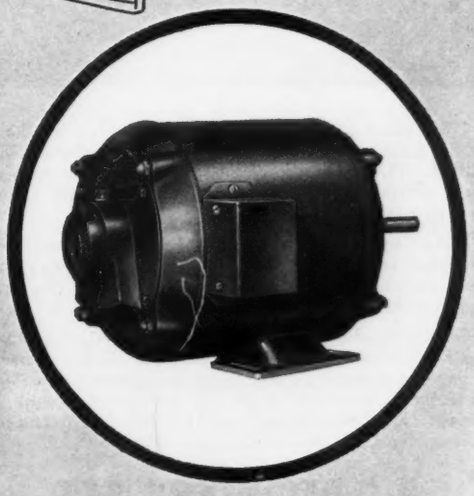


# Specified Performance of Century Motors

## Meets the Demand of Modern Heating, Cooling or Air Conditioning



WHETHER you buy, make or install modern heating, cooling or air conditioning equipment, you must know the performance characteristics of the motor; you must be sure that the motor accurately matches the power demands of the installation in order to deliver the greatest satisfaction to the user.

Because of Century's years of experience in solving the problems of correct motor application in these fields, because of Century's exceptionally wide range of motor types and sizes, Century can specify motor performance in advance. You can have complete confidence in the ability of Century Motors to do the job *right*.

There's a Century Motor for every heating, cooling, air conditioning or refrigeration requirement—properly designed and engineered for their particular job.

Century's years of experience are always at your service through the Century Motor Specialist nearest you. Get the benefits of his counsel by calling him in today.

**CENTURY ELECTRIC COMPANY**
1806 Pine Street St. Louis, Mo.
*Offices and Stock Points in Principal Cities*

## *Check These Advantages of Century Motors For Your Installations or Products*

✓ **QUIET STARTING** — no groans or annoying noises at starting that often are more disturbing than operating noises.

✓ **QUIET RUNNING** — true heating and air-conditioning comfort must be quiet comfort — always.

✓ **FOR HARD TO START LOADS** — Century Motors have the ability to start and bring the modern compressor up to speed without over-motoring the running load. The same is true when properly applied to stokers and other appliances that start up under heavy loads.

✓ **BUILT-IN THERMAL OVERLOAD PROTECTION** — at very low cost. Protects against over-current and over-temperature. Popular ratings listed by Underwriters.

✓ **EXTRA PROTECTION FOR DAMP BASEMENTS**—Century's new specialized insulation resists moisture. Gives added safety assurance in the presence of excessive basement moisture—especially during the season when the motor is idle.

✓ **LONG LIFE CONSTRUCTION**—large bearings, machined from phosphor bronze castings, provide greater safety to unintentional abnormal belt tension stresses. Unique bearing bumpers prevent annoying end bumps from V-belt irregularity. Century's wool yarn system of lubrication (fractional sizes) lubricates for at least a year without re-oiling.

✓ **LOW STARTING CURRENT**—where current limitations are a problem, Century Type RS Repulsion Start Induction Brushlifting Motors for single phase and Type AS Automatic Start for polyphase, reduce light flicker and give better results when lines are heavily loaded.

Century MOTORS

***One of the Largest Exclusive Motor Manufacturers in the World***

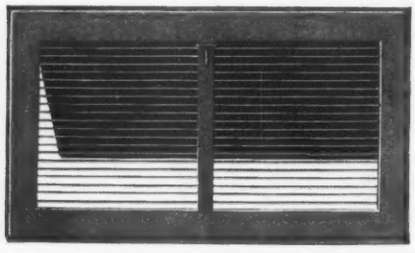
# 1939 Has Proven the Preference for U.S. REGISTERS

1939 success has come to jobbers and dealers who have confined their purchases to one FULL-LINE MANUFACTURER. 1939 sales records prove that more and more of them selected U. S. Registers as the Full-Line best suited to their needs.

Everything you need for competitive jobs—everything you need for those fine installations on which you make your reputation—is in stock for you at the U. S. Factories and Branches.

Gravity Baseboard and Floor Registers—Air-Conditioning Registers of all types and all price classes—frames, piping, sheet metal accessories—one order and one shipment brings them all to you at substantial savings in cartage, handling, storing, and bookkeeping. Concentrate on the U. S. Line for greater profits.

## A-C REGISTERS SET NEW PRODUCTION RECORDS

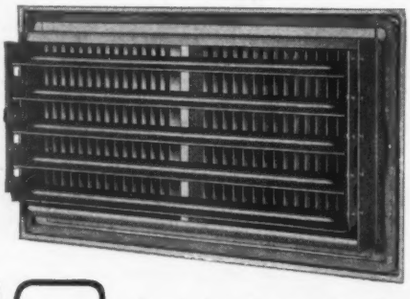


No. 153 LOUVER-TYPE REGISTER

The most Economical, Correct and Convenient way to meet Air-Conditioning directional-flow requirements is with U. S. Louver-Type Registers equipped with Inset Panels for right, left, or multi-flow.

## New U. S. 200 Line Is a Sensation

Where Multi-Louver Adjustable-Bar Registers are indicated, this new U. S. series gives FULL GRILLE COVERAGE and COMPLETE directional flow without "trick" gadgets. The Duo-Deflection Line.



## Everything for Gravity Jobs

**NATIONAL**

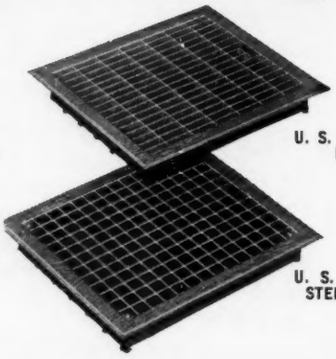
National registers are the favorites everywhere an inexpensive Neat Diamond Lattice Design is desired.

**PANAMA**

Modern beauty — easy installation features—make it the most popular of all Bar-Type Designs.

## Unusual Values in Floor Registers

Natural wood grain finish photographically reproduced and transferred — maximum free area for fast efficient circulation—rugged strength to withstand years of use—job-proven easy installation features—never before has the heating industry been so enthusiastic in its use and indorsement of U. S. Steel and Trussteel Floor Registers and Faces.

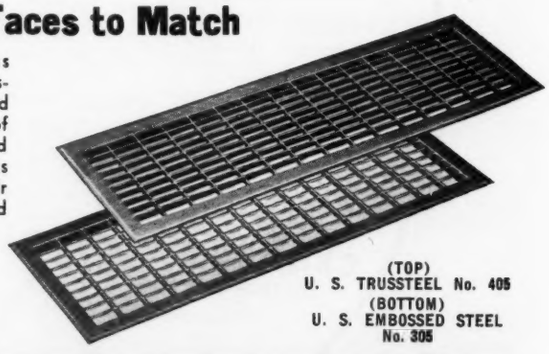


U. S. TRUSSTEEL No. 400

U. S. EMBOSSED STEEL No. 300

## Cold Air Faces to Match

The Seamless Corners of Trussteel Faces and the Strength of U. S. Embossed Steel Faces has justly earned their popularity and preference.



(TOP)
U. S. TRUSSTEEL No. 405
(BOTTOM)
U. S. EMBOSSED STEEL No. 305

*Send for Latest Catalog and Prices*

**UNITED STATES REGISTER CO.**

**BATTLE CREEK, MICHIGAN**

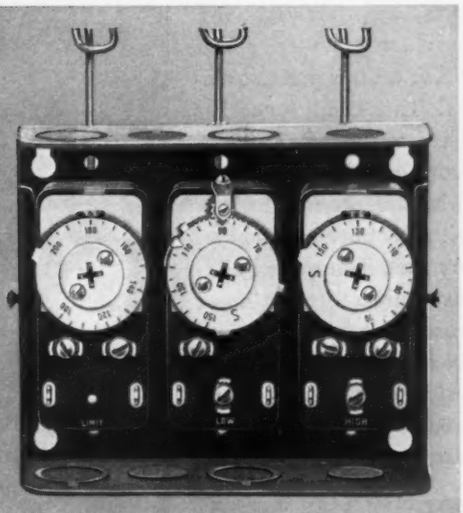
MINNEAPOLIS • KANSAS CITY • ALBANY • SAN FRANCISCO • NEW YORK, N. Y.

# PUT "*Hydraulic Action*" TO WORK FOR YOU!

**Single Switch Control with cover removed—Type 513 single-speed fan control or Type 408 limit control.**

These warm-air Limit and Fan Controls represent the outstanding advantages of "Hydraulic Action" to the warm-air heating and ventilating industry. They will improve the operation of the equipment you manufacture or install. *Visible, uniformly calibrated dials* and the *easily set differential adjustor* mean quick installation without fuss or guess-work. *Fast-acting thermal elements* mean quick response to rapid changes in bonnet temperatures resulting in safe limit temperatures and accurate fan operation. *Positive operation* throughout the range because the power of "Hydraulic Action" is always the same even at the lowest temperature within the range. *Independently adjustable switches* on combinations. Separate sensitive elements and switch assemblies result in combination fan, limit and two-speed controls which can be set to suit the individual installation.

**Dual Switch Control—combination fan and limit Control, Type 519, or two-speed fan control, Type 523.**



**Triple Switch Control—two-speed fan and limit control. Type 547.**

The widespread use of White-Rodgers Warm Air Fan and Limit Controls is positive evidence that heating engineers and installation men alike know what "Hydraulic Action" does to insure uniform, healthful, safe warm air heat. Take advantage of "Hydraulic Action" on your next installation.

Complete application data on White-Rodgers warm air controls has been prepared for your use. Ask for it by mailing the coupon today.

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*Controls for Refrigeration • Heating • Air-Conditioning*
**1215 CASS AVENUE**
**SAINT LOUIS, MISSOURI**

HYDRAULIC ACTION CONTROL

**MAIL COUPON FOR DETAILS**

WHITE-RODGERS ELECTRIC COMPANY
1215 Cass Ave., St. Louis, Mo.

Gentlemen: Please send me complete application data on your "Hydraulic Action" Fan and Combination Fan and Limit Controls.

Firm.....

Individual.....

Street No.....

City.....State.....

# A SMASH HIT!

# FITZGIBBONS

## *Directaire*

IT'S brought them up on their feet — architects, builders, heating contractors, burner and stoker dealers, home owners! This conditioner has what everyone wants — economical and dependable air conditioning, with any burner or stoker, any fuel, fitting the building budget of any home from the low cost five- or six-room house to the large residence requiring up to 600,000 B.t.u. Check the features listed here, then

- Built of heavy copper-bearing steel plate, crack-proof, corrosion-resistant, quick heating —
- Fitzgibbons "Weldseal" construction, eliminating all possibility of gas and dust leakage into pure air stream —
- Fitzgibbons "Contra-Flo" circulation, assuring maximum efficiency in heat transfer —
- Quick installation—a minimum of assembly on the job —
- Easy cleaning through straight, unobstructed fire tubes. No inaccessible corners —
- Quiet operation, rubber mountings for all moving parts —
- Compact, fitting practically anywhere in any basement plan —
- Two types, seven sizes, meeting virtually every condition of price and capacity.

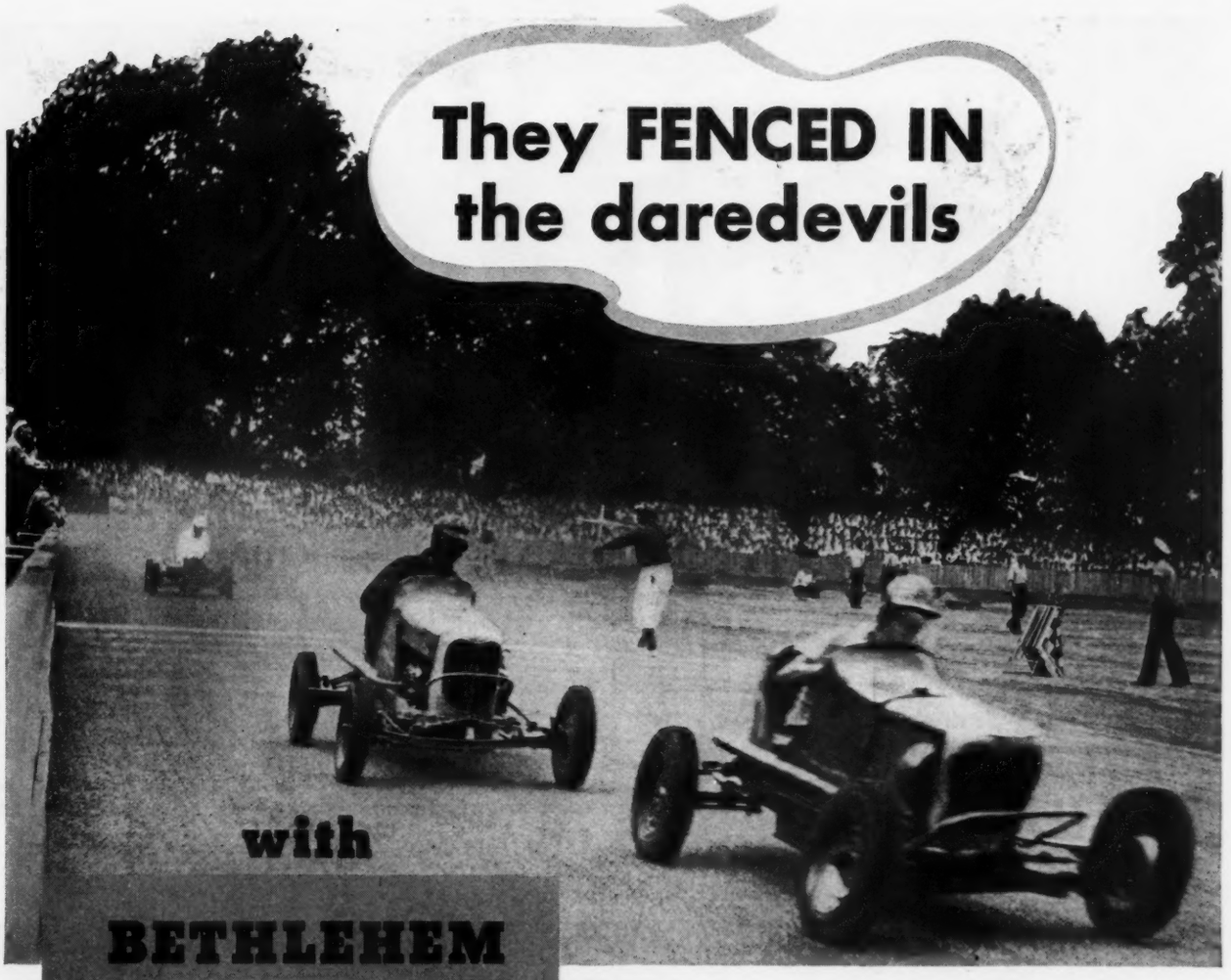
**CERTAIN TERRITORIES STILL AVAILABLE—WRITE DEPT. A FOR DETAILS**

***Fitzgibbons Boiler Company, Inc.***

GENERAL OFFICES: 101 Park Avenue, New York, N. Y.
Works: OSWEGO, N. Y.

*BRANCHES AND REPRESENTATIVES IN PRINCIPAL CITIES*

# They FENCED IN the daredevils



with

## BETHLEHEM *GALVANIZED* Steel Sheets

Midget race track at Dorney Park, Penna., outside fence containing 11,250 sq. ft. of Bethlehem corrugated steel sheets.

THE manager of this amusement park wanted to enclose his new race track with an outside fence that couldn't be seen through, climbed or broken, a fence that needs a minimum of maintenance.

His decision to use corrugated steel for this job is an unusual sheet application that might well be turned into profit by sheet-metal contractors specializing in roofing.

Bethlehem corrugated roofing sheets are ideal for installations of this type. They are made of rugged, full-gage steel, tightly coated with weather-resistant zinc. They combine structural strength with long life and low maintenance. Why not recommend them for enclosures for parks, factories or power stations, wherever privacy and durability are deciding factors?

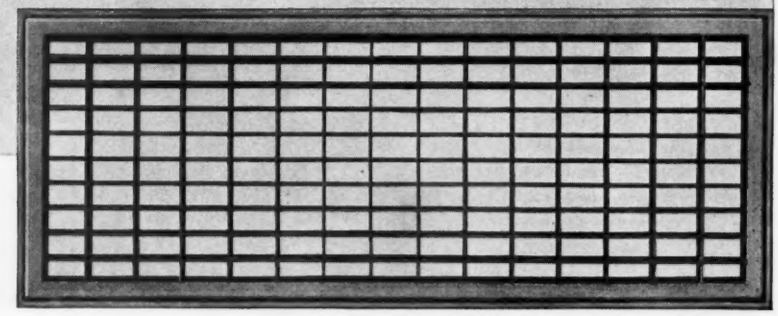
*Bethlehem Sheets are available through your distributor*

**BETHLEHEM STEEL COMPANY**

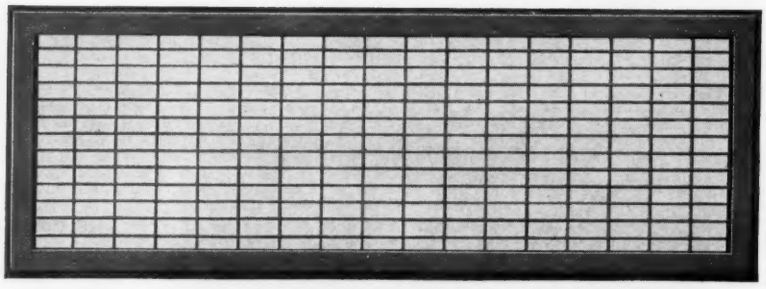
BETHLEHEM STEEL

# INDEPENDENT "FABRIKATED"

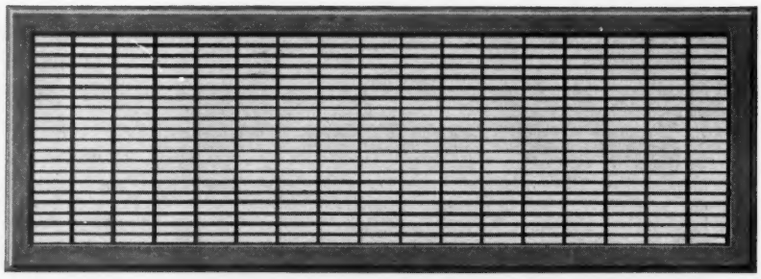
## *Cold air faces*



No. 130: Face Openings $13\frac{1}{16}$" x $1^{11}\frac{1}{16}$"



No. 132: Face Openings $\frac{5}{8}$" x $1^{11}\frac{1}{16}$"

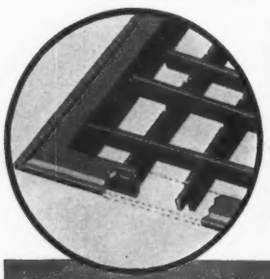


No. 131: (Close Mesh) Face Openings $\frac{3}{8}$" x $1^{11}\frac{1}{16}$"

## MADE TO FILL ANY REQUIREMENT

Whether you require the utmost in free air area or fine appearance, together with great strength and rigidity, you will find a type and a size in Independent "Fabrikated" that exactly meets the need. Cold Air Faces of Independent "Fabrikated" construction harmonize fully with the newest "Fabrikated" registers and grilles. Made in a wide range of standard sizes for prompt shipment, priced to give you best values.

**Send for new catalog**



The bars are forced together, making the grille substantially one piece. Ends are clinched outside the frame so each member is sustained independently.

239

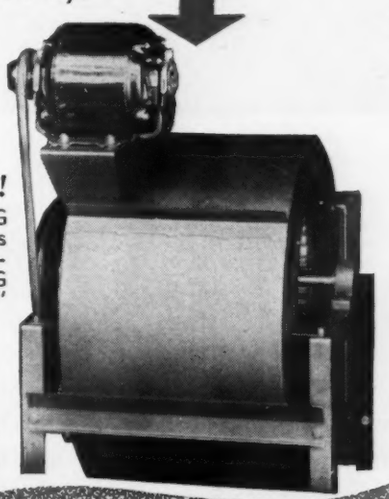
## THE INDEPENDENT REGISTER CO.

3747 EAST 93RD STREET CLEVELAND, OHIO

# Carrier chooses VIKING Blowers

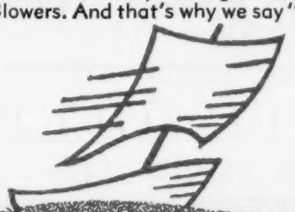
--- because of their quietness, efficiency, and the engineering cooperation of the Viking Company

• Coming from Carrier Corporation, with its 37-year old reputation in the air-conditioning field, the above statement **means something.** For Carrier **insists on the best** and test after test was made by their research engineers to achieve the utmost in quietness, efficiency and dependability of blower operation. Viking is justifiably proud of the final selection of Viking blowers for the complete line of Carrier Home-Weathermakers. . . . Of particular interest is the fact that specially designed Viking blowers are also standard on the new Carrier unit just being introduced for LOW COST homes. Here the added requirements of compactness, low cost, and economy had to be met — without sacrificing quietness and efficiency.



**LOOK AT THE BLOWER** *in the Air Conditioner you sell!*

• If it's a VIKING, you are assured satisfactory, quiet, trouble-free operation. VIKING engineering has developed a formula for blower designs which, size for size, gives **more air at higher pressures** with less horsepower and less noise than heretofore possible. That's why leading manufacturers who insist on competitive tests choose VIKING Blowers. And that's why we say "LOOK AT THE BLOWER in the air conditioner you sell."

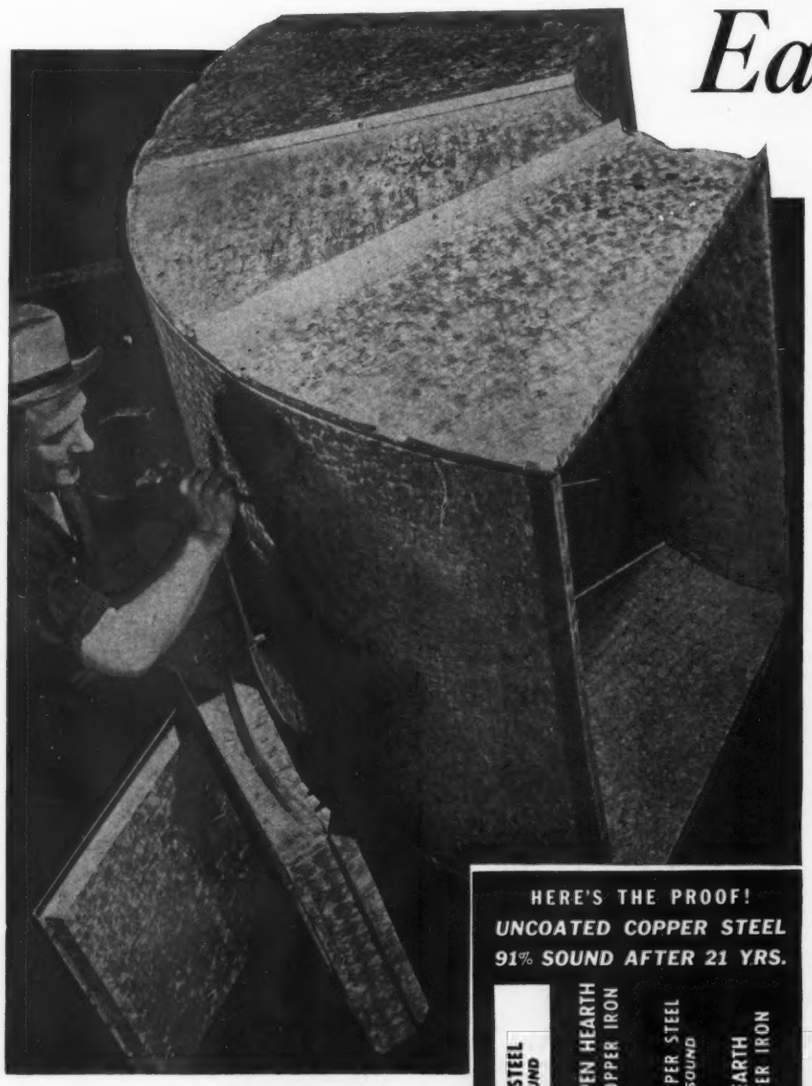


*Complete sales and advertising program available for dealers. Write Dept. A*

**VIKING AIR CONDITIONING CORP.**
**9500 Richmond Avenue, S. E. Cleveland, Ohio**

## VIKING AIR CONDITIONING CORPORATION

# HERE'S YOUR ASSURANCE OF DUCTS THAT ARE *Easy to Build... Easy to Sell!*



*NOTICE THE 180° BENDS, the neat turns, the complicated door for this piece of duct work. The easy workability of U·S·S Galvanized Copper Steel cuts fabricating time on jobs like this. The extra protection this metal offers against rust adds materially to its life.*

This chart compiled from inspection reports of the Committee on Corrosion of Iron and Steel, A.S.T.M. Proceedings 1937, shows results of tests carried on at Annapolis, Md. from 1916 to 1936. After 21 years' exposure, 91% of COPPER STEEL sheets remained "sound" (unperforated). Other materials were decidedly inferior.

YOUR customers want long-lasting metal work—and you want a steel that's easy to work. U·S·S Galvanized Copper Steel satisfies both requirements. Cut it. Bend it. Rivet it. You'll find it fabricates readily into complicated shapes; helps secure neat joints, true bends, tight seams; saves valuable time on any job.

And for your clients, the use of U·S·S Copper Steel for ducts, housings, furnaces, results in definite savings over a period of years. The extra protection against rust that this material offers assures fewer replacements, longer-lasting installations, lower maintenance costs and consequently, satisfied customers. It's easy to sell a heating system built of U·S·S Galvanized Copper Steel because of its many advantages.

Ask your supplier about U·S·S Copper Steel, galvanized or terne plate. It is rapidly becoming the preferred metal for air-conditioning systems, roofing, gutters, downspouts, flashings. Write today for complete information.

USS

**LOOK FOR THIS SYMBOL**

*It's the sign of high quality and helps you make more sales.*

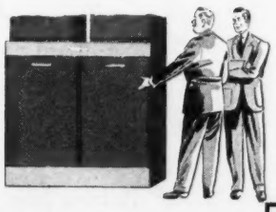
## U·S·S GALVANIZED COPPER STEEL SHEETS

CARNEGIE-ILLINOIS STEEL CORPORATION, *Pittsburgh and Chicago*
COLUMBIA STEEL COMPANY, *San Francisco*
TENNESSEE COAL, IRON & RAILROAD COMPANY, *Birmingham*

Scully Steel Products Company, Chicago, *Warehouse Distributors* · United States Steel Products Company, New York, *Export Distributors*

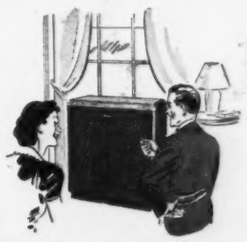
**UNITED STATES STEEL**

# ☑ CHECK WHAT YOU WANT in your profit-making set-up:

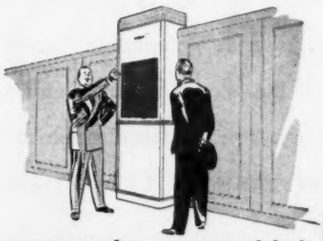


**PROFITS from warm air heat.** Do you know that G-E has announced *new low prices* on the *new* G-E Oil Winter Air Conditioner? Here's a real opportunity to sell abundant heat at low cost . . . plus winter air conditioning. Sound profits too! ☐

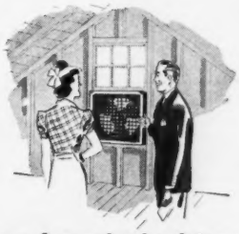
**PROFITS from split systems.** The last word in automatic, conditioned heating—controlled *warm air heat plus winter air conditioning.* (A G-E Oil or Gas Furnace with a G-E Winter Air Conditioner.) New opportunties for both new equipment and duct profits! ☐



**PROFITS from home summer cooling.** So that you can reach every type of prospect, G-E has small units for cooling one room or complete, central plant systems for cooling the entire house. A logical market when your heating sales season is over! ☐



**PROFITS from commercial air conditioning.** From individual store and office cooling units (famous G-E "Packaged Weather") to complete central plant cooling for stores, shops, hotels, theatres, etc. Also G-E Condensing Units from fractional to 60 h.p. G-E offers you a product for every prospect and a profit! ☐



**PROFITS from air circulators.** There are a lot of extra dollars in this "Natural" for lower income homes. You sell cool comfort at low cost. For homes, offices, stores, shops, restaurants, factories, etc. All types of circulators use the unique G-E Aphonic Fan for unusual quietness! ☐

**PROFITS the year 'round!** From *one* company, with *one* high standard of quality, from *one* source for all products. G-E offers you *complete* lines that permit selling *every* prospect *every* month in the year. With G-E you iron out the depressions for year 'round turnover and profit! ☐

**PROFITS from advertising and promotion.** Everybody knows G-E. National magazine and cooperative newspaper advertising brings you leads and helps build your success. G-E gives you every possible type of dealer support—direct mail, store identification, displays, literature, etc., the best of everything! ☐

## You get all these—*and a lot more too* in a G-E DEALER FRANCHISE ☑

Certain dealers who recognize this opportunity will see (1) a merchandising set-up second to none (2) *complete* lines of products that meet *every* competition, that fit *every* market, that reach *every* prospect, that sell *every* month in the year. (3) An organization second to none that offers *every* possible sales and engineering support.

Dealers with vision will see in a G-E Dealer Franchise a unique opportunity to build their own personal success and security. There is much more you should know. Write or mail the coupon today.

**FILL IN AND MAIL COUPON** ➡

**GENERAL ELECTRIC**
*Automatic Heating, Cooling and Air Conditioning*

GENERAL ELECTRIC COMPANY
Div. 190-753, Bloomfield, New Jersey
Give me details of the new G-E Dealer Franchise for my territory.

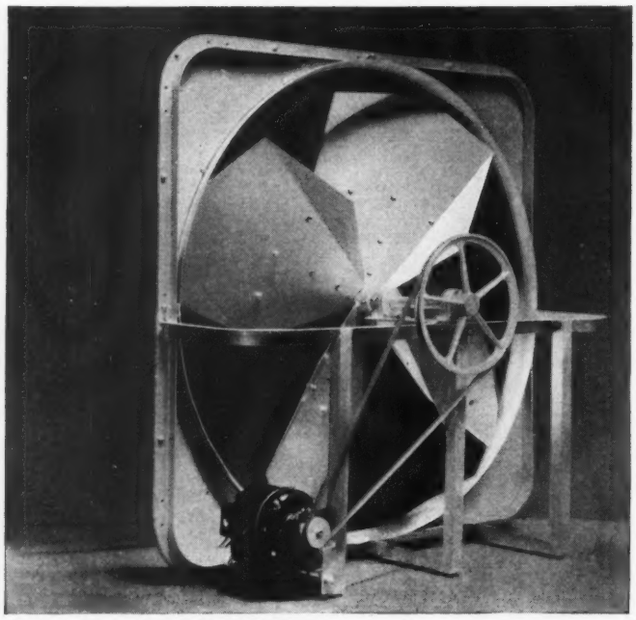
NAME.....

STREET.....

CITY.....STATE.....

## WHEN A FAN IS ON SKF RUBBER FLEX PILLOW BLOCKS

# IT'S ALWAYS QUIET



BUILT BY S. R. LEESON & ASSOCIATES

The wide acceptance of SKF Rubber Flex Pillow Blocks since their inception 10 months ago is due to the same smoothness and quietness you find in the two SKF's on this fan.

S. R. Leeson & Associates were quick to recognize the many advantages of a self-contained, totally-enclosed pillow block that's self-aligned, electrically grounded, and that requires no shaft machining . . . a pillow block that's made QUIET by a rubber ring.

A specially prepared folder tells you more about these popular pillow blocks. Send for it today.

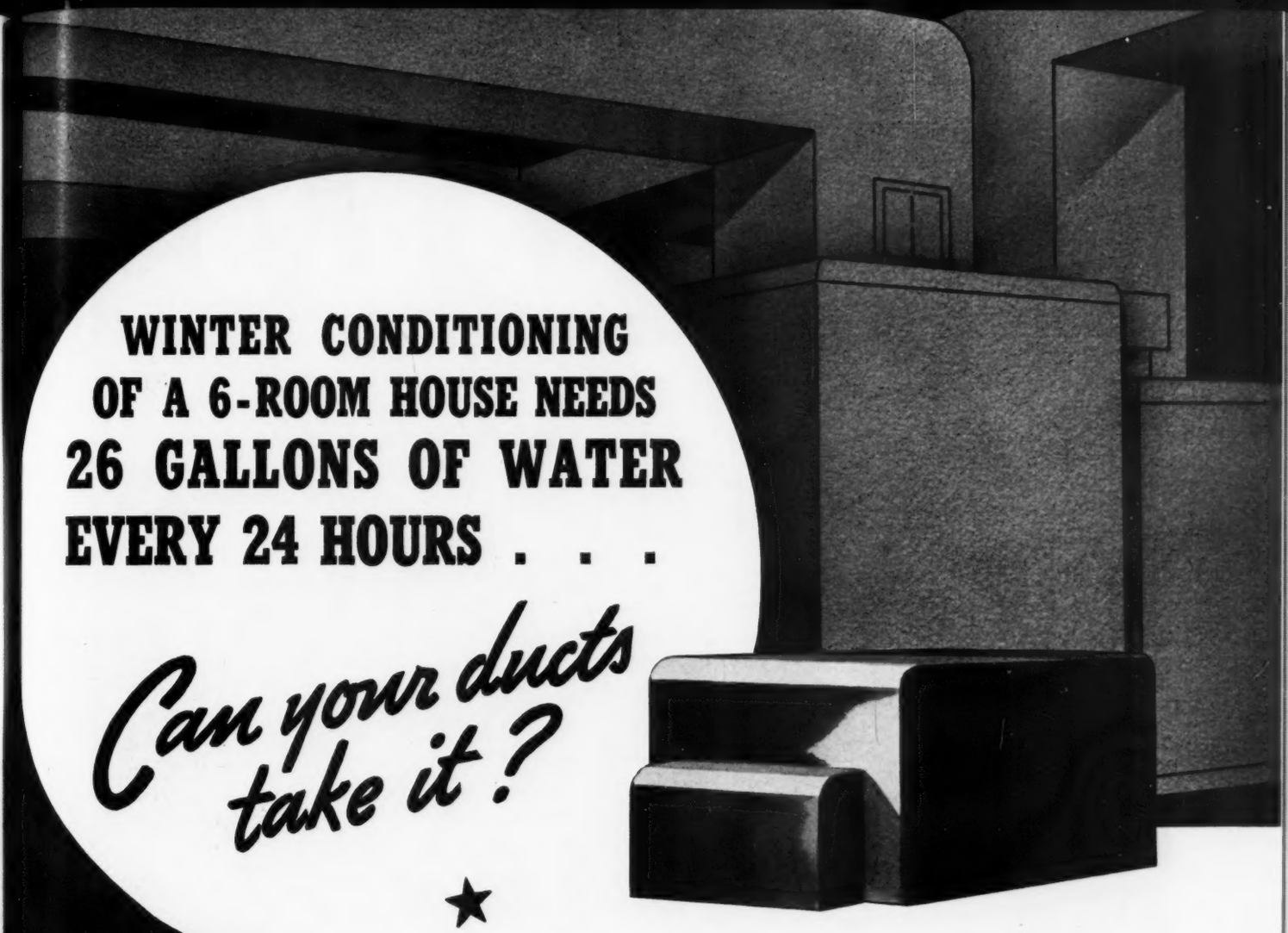
4429

SKF INDUSTRIES, INC., PHILADELPHIA, PA.

# THE BEARINGS ARE

# SKF

**BALL & ROLLER BEARINGS**



# WINTER CONDITIONING OF A 6-ROOM HOUSE NEEDS 26 GALLONS OF WATER EVERY 24 HOURS . . .

## *Can your ducts take it?*

★

The average 6-room house needs about 26 gallons of water every 24 hours to maintain the accepted standard humidity for winter air conditioning. Contrasted with the dry air of the hot air jobs, that's about 350% more water to cause duct corrosion.

Alert sheet metal contractors realize these conditions and meet them with Youngstown Galvanized Sheets. The care used in cleaning the Youngstown base metal plus the care and lack of haste in the galvanizing operation has produced a galvanized sheet with a full generous coating of zinc, and a thorough adherence of the zinc to the base metal. You get only prime sheets, fully coated and strictly up to the Youngstown standard for quality.

Buy Youngstown Galvanized Sheets for your duct jobs. You'll make installations on schedule, and you'll be sure the jobs will stand up in service.

GALVANNEALED TRADE MARK YOUNGSTOWN SHEETS

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon and Alloy Steels

General Offices - YOUNGSTOWN, OHIO

★

Sheets - Plates - Pipe and Tubular Products - Conduit - Tin Plate
Bars - Rods - Wire - Nails - Tie Plates and Spikes 10-8B

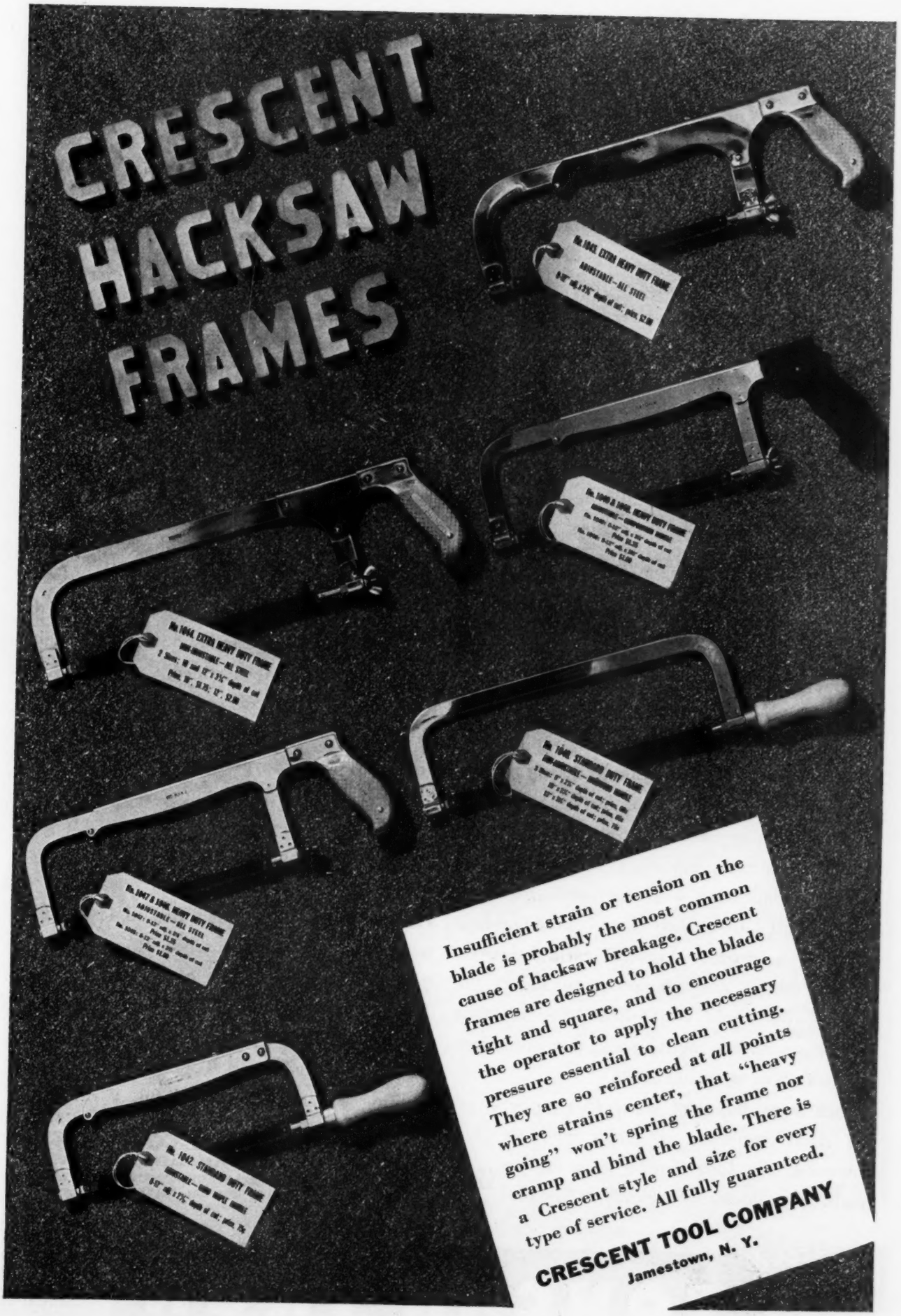
# RYBOLT

• All air conditioning units look more or less alike to your customer. He knows little about the mechanical differences and cares less. What he really wants to buy is dependable, convenient and economical heating service to meet his special requirements.

He wants to enjoy the comfort and health provided by modern features which purify, humidify and automatically circulate the air at an even temperature throughout the house. RYBOLT Air Conditioning units are designed and built to meet these demands with complete assurance of unfailing performance. You can sell them with absolute confidence in their ability to deliver satisfaction. That is why every RYBOLT Air Conditioning unit you sell helps to sell another.

Write today for important information on the complete RYBOLT line.

**THE RYBOLT HEATER COMPANY**
**615 MILLER STREET • ASHLAND, OHIO**


CRESCENT
HACKSAW
FRAMES
Insufficient strain or tension on the blade is probably the most common cause of hacksaw breakage. Crescent frames are designed to hold the blade tight and square, and to encourage the operator to apply the necessary pressure essential to clean cutting. They are so reinforced at all points where strains center, that "heavy going" won't spring the frame nor cramp and bind the blade. There is a Crescent style and size for every type of service. All fully guaranteed.
CRESCENT TOOL COMPANY
Jamestown, N. Y.

# DOWN TO EARTH FACTS

# ABOUT TONCAN IRON

*There isn't a man selling Toncan Iron who hasn't at one time or another been asked this question — "Why is Toncan Iron better than 'pure' iron"?*

*We're going to tell you.*

**More than 30 years ago,** Toncan Iron began its career as a "pure" iron. But out of Republic's metallurgical experience in the production of fine alloys came the idea that certain alloying elements added to *the same "pure" iron* might make it even better and increase its resistance to corrosion. Copper was added and a marked increase in corrosion-resistance was noted. Even a small percentage of copper was advantageous. So, reasoned the metallurgists, if a little copper is good, why not use more? But all irons and steels have an appetite for copper that is easily satisfied. Additions beyond a certain low percentage do not alloy with the iron in the same manner, and consequently there is no advantage to using it. Further experimenting, however, showed that if molybdenum were added, the "pure" iron would alloy with twice as much copper — with the logical result that corrosion-resistance was again increased.

**No one argues the point, today,** that copper-bearing steels, subjected to many types of corrosion, last longer than plain carbon steels. Then doesn't it logically follow that a highly-refined iron alloyed with molybdenum and twice the amount of copper that any commercial copper-bearing steel will hold will last longer than a "pure" iron? As a matter of fact, we, too, in addition to Toncan Iron, make pure iron, steel, copper-bearing steel and other ferrous materials — and we recommend and sell products made from these materials for services where the better corrosion-resistance of Toncan Iron is not required and its slightly higher cost is not justified.

**Please understand** — we are not trying to start a controversy. We just want you to know what goes into this alloyed "pure" iron known as Toncan Iron, why the alloying elements are used, and why Republic, the world's largest producer of alloys, recommends Toncan Iron for severe classes of service.

**Perhaps it might be a good idea** to lean a little more on Republic's experience. No company can prosper by giving a buyer poor advice.

**So let us suggest** the correct material for specific uses — and relieve you of worries and responsibilities. Literature on Toncan Iron costs you nothing and may prove helpful. Write for it.

REPUBLIC STEEL

**REPUBLIC STEEL CORPORATION**
GENERAL OFFICES: CLEVELAND, OHIO
BERGER MANUFACTURING DIVISION • NILES STEEL PRODUCTS DIVISION • STEEL AND TUBES, INC
UNION DRAWN STEEL DIVISION • TRUSCON STEEL COMPANY

## TONCAN IRON

AN ALLOY OF REFINED OPEN-HEARTH IRON, COPPER AND MOLYBDENUM . . . THAT GROWS OLD SLOWLY

AMERICAN ARTISAN

Volume 108 Number 11

# Far Fields Look Greener

IN a letter recently received from Mr. B. F. John, Philadelphia, answering an inquiry about a job in progress there, he reports that of late the large contracts seem to be going to firms whose home office is outside of Philadelphia and, also, that on many such jobs there always appears some firm willing to take a flyer for no better reason, seemingly, than because distant jobs seem more profitable.

We are reminded that during the last eight months a very large number of shops called on have work under way, but always scores or hundreds of miles from home. We have speculated on this situation, without arriving at any good reason why such a situation should exist and without getting any satisfactory answer from the contractors involved. We know contractors in the middle west doing large contracts on the Atlantic seaboard. We know contractors down south doing jobs in New England and on the West coast. No doubt the same situation exists all over the country.

It has always been that certain very large contractors make a specialty of taking big jobs no matter where the job is located. Some of these firms cooperate with national architectural firms or nationally operating general contractors; therefore, work away from home constitutes a legitimate field for these concerns. However, it is not these firms, we observe, which are getting a great deal of the work mentioned —rather, such work is going, as Mr. John says, to firms taking a flyer and ill equipped, either financially or on the basis of organization, to take work which is too far away for personal and direct supervision.

The fact that so many of these jobs lately are being finished by the bonding companies, is sufficient evidence that firms taking a flyer are usually not organized for this type of operation.

The situation is not being helped, we are sure, by the direct selling manufacturer or manufacturers' representative who moves heaven and earth to get his equipment and layouts accepted and then scramble from Newark to Omaha to find some contractor willing to gamble on the metal work under conditions completely unfamiliar. Under the best of conditions such a contractor can hope for only negligible profits from his work because there is no cushion in the equipment. This same contractor, it seems, approaches his bid with the feeling that there will be many low prices from "home-town" contractors and he must, therefore, use a very sharp pencil. The inevitable result is that a few days of delay or some minor misunderstandings about work specified, kills all chance of profit and may cripple the contractor so badly that the bonding company has to take cover.

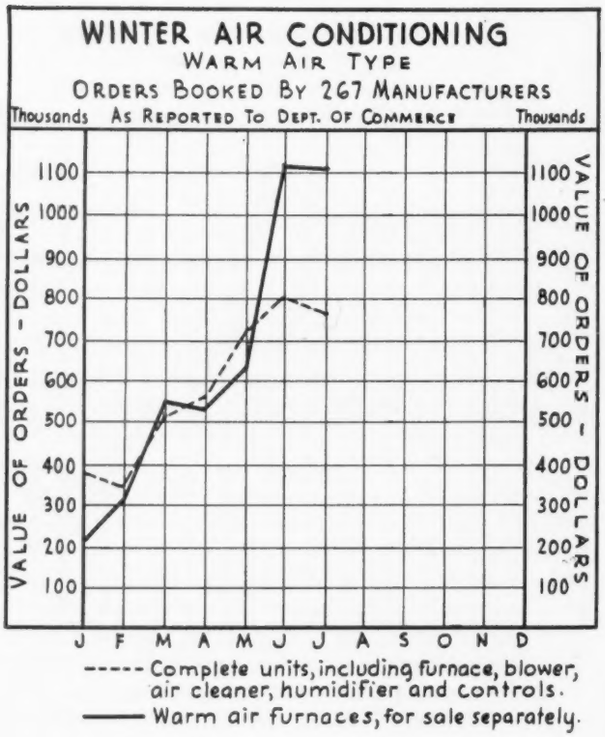
As is the case in most of these problems, there seems to be no quick and easy solution. There is no way to keep contractors "at home." There is no way to make sure that the contractor has adequately "covered" himself. There is no way of keeping buyers from buying from any man, any where. Nor do we wish to restrict national operations too much because everyone admits that the "little fellow," poorly organized, inadequately financed, improperly trained, though he be "at home" is just as bad and often a worse risk than the larger shop, operating over a wide area, but trained in large scale operations.

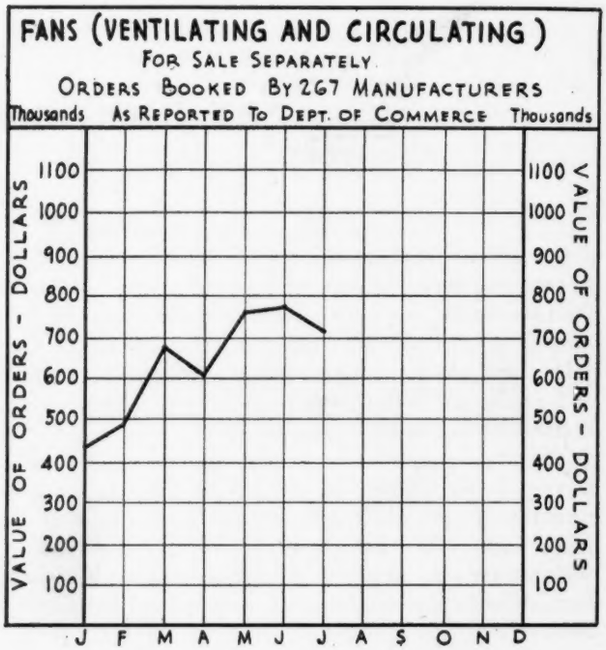
This situation is part and parcel of the construction industry. Suggestions have been and will be offered —what, if anything, will eventually develop no man can foresee. It has been suggested that certain regulations be incorporated in local and state licensing laws to insure that a contractor knows his business and is a legitimate operator. Under such a plan a contractor would be licensed to do certain types of work and would be bracketed according to technical and financial ability to take contracts involving specified amounts of money. So far as we know this idea has never been tried by any branch of the construction industry. In other businesses a firm's ability to take a contract is judged largely by financial standing and reputation, but in construction the lowest bidder too often gets the contract, regardless.

It seems to us that in situations like this, for discussion of problems of this kind, local, state and national associations should play a star role. Also, that licensing and ordinances must be used to establish the necessary standards by which the contractor is judged. In such problems this industry should find a real reason for strong and active associations of all kinds.

# Current Business Trends

IT has been only since January 1, 1939, that the Department of Commerce has reported separately on the orders booked for warm air furnaces, complete forced air furnace units and ventilating fans. The trend of such orders from month to month *this year* can be noted from the accompanying charts. It will be possible in 1940 to compare orders of one month with those of the same month of the year before. However, in the entire group of air conditioning equipment from which these figures are now available separately, 1939 to date is 22 per cent ahead in orders over 1938. In the case of oil burners and stokers, such comparisons are now directly available, as shown on their charts, and it will be noted that in these divisions of the field, as well, 1939 is well ahead of 1938.


WINTER AIR CONDITIONING
WARM AIR TYPE
ORDERS BOOKED BY 267 MANUFACTURERS
Thousands AS REPORTED TO DEPT. OF COMMERCE Thousands
VALUE OF ORDERS - DOLLARS
VALUE OF ORDERS - DOLLARS
1100 1000 900 800 700 600 500 400 300 200 100
J F M A M J J A S O N D
----- Complete units, including furnace, blower, air cleaner, humidifier and controls.
—— Warm air furnaces, for sale separately.


FANS (VENTILATING AND CIRCULATING)
FOR SALE SEPARATELY
ORDERS BOOKED BY 267 MANUFACTURERS
Thousands AS REPORTED TO DEPT. OF COMMERCE Thousands
VALUE OF ORDERS - DOLLARS
VALUE OF ORDERS - DOLLARS
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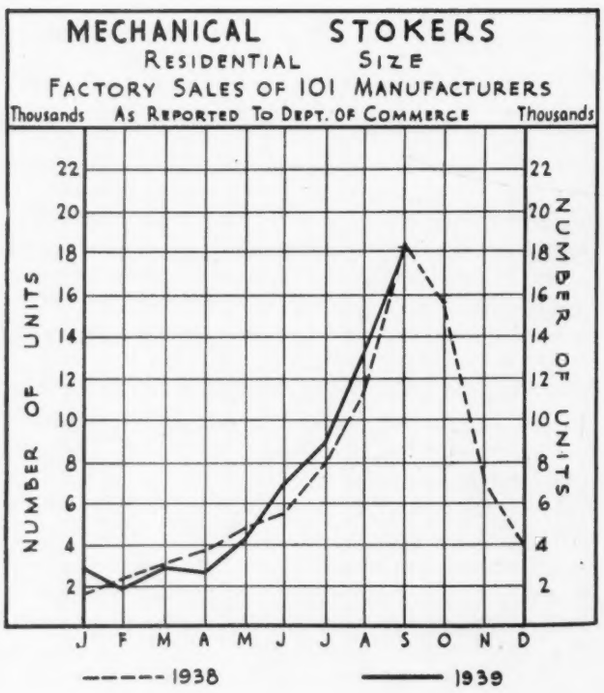
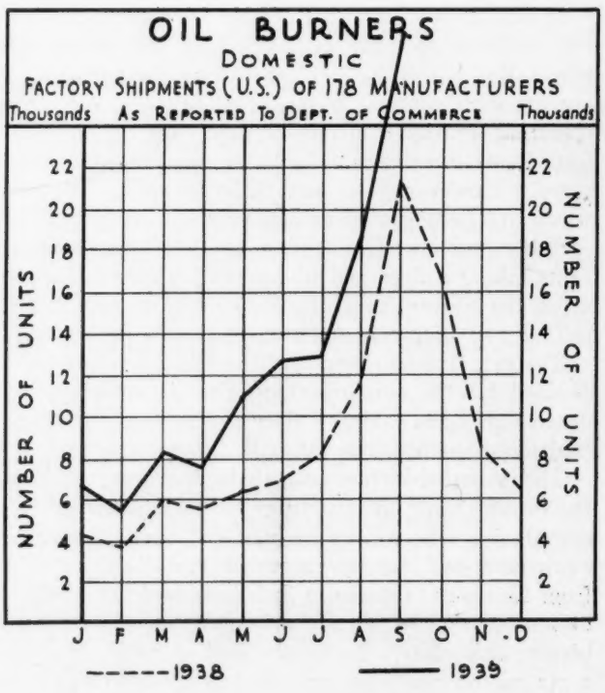
J F M A M J J A S O N D


MECHANICAL STOKERS
RESIDENTIAL SIZE
FACTORY SALES OF 101 MANUFACTURERS
Thousands AS REPORTED TO DEPT. OF COMMERCE Thousands
NUMBER OF UNITS
NUMBER OF UNITS
22 20 18 16 14 12 10 8 6 4 2
J F M A M J J A S O N D
----- 1938 —— 1939


OIL BURNERS
DOMESTIC
FACTORY SHIPMENTS (U.S.) OF 178 MANUFACTURERS
Thousands AS REPORTED TO DEPT. OF COMMERCE Thousands
NUMBER OF UNITS
NUMBER OF UNITS
22 20 18 16 14 12 10 8 6 4 2
J F M A M J J A S O N D
----- 1938 —— 1939

# RESIDENTIAL AIR CONDITIONING

## SECTION

DEVOTED TO HOME AND SMALL COMMERCIAL AIR CONDITIONING

# Deep Crimping

## Increases Type "G" Drifilter surface to 5 TIMES its frontal area!

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Other outstanding advantages of the Type G Drifilter are its low first cost, its cleanability (by simply rapping out the dust), its high efficiency and the fact that it is both odorless and flame proof.

### THIS LOW COST TYPE G FILTER IS CLEANABLE TOO!

Low cost and cleanability is a rare combination in a filter as efficient in operation as the new Type G Drifilter. Dust accumulation can be rapped out several times before renewal is necessary, making its active life in service as long or longer than any other type throw-away filter.

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THE AMERICAN

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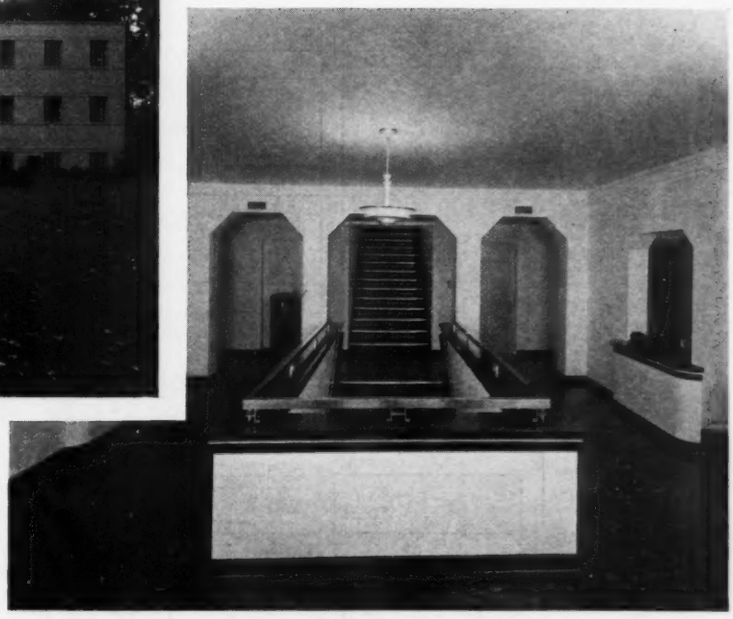


Exterior of the two-story building and, right, the entrance lobby showing typical high side wall supplies (see first floor plan). Returns (baseboard location) are about where the photographer was standing.

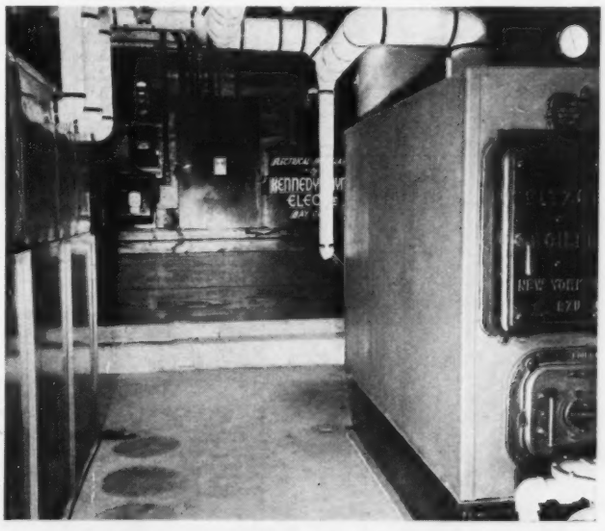
# Ten-Zone, Gas-Heated, Indirect-Fired Air Conditioning System in a Clinic

By E. C. Henry
E. C. Henry Co., Bay City, Michigan

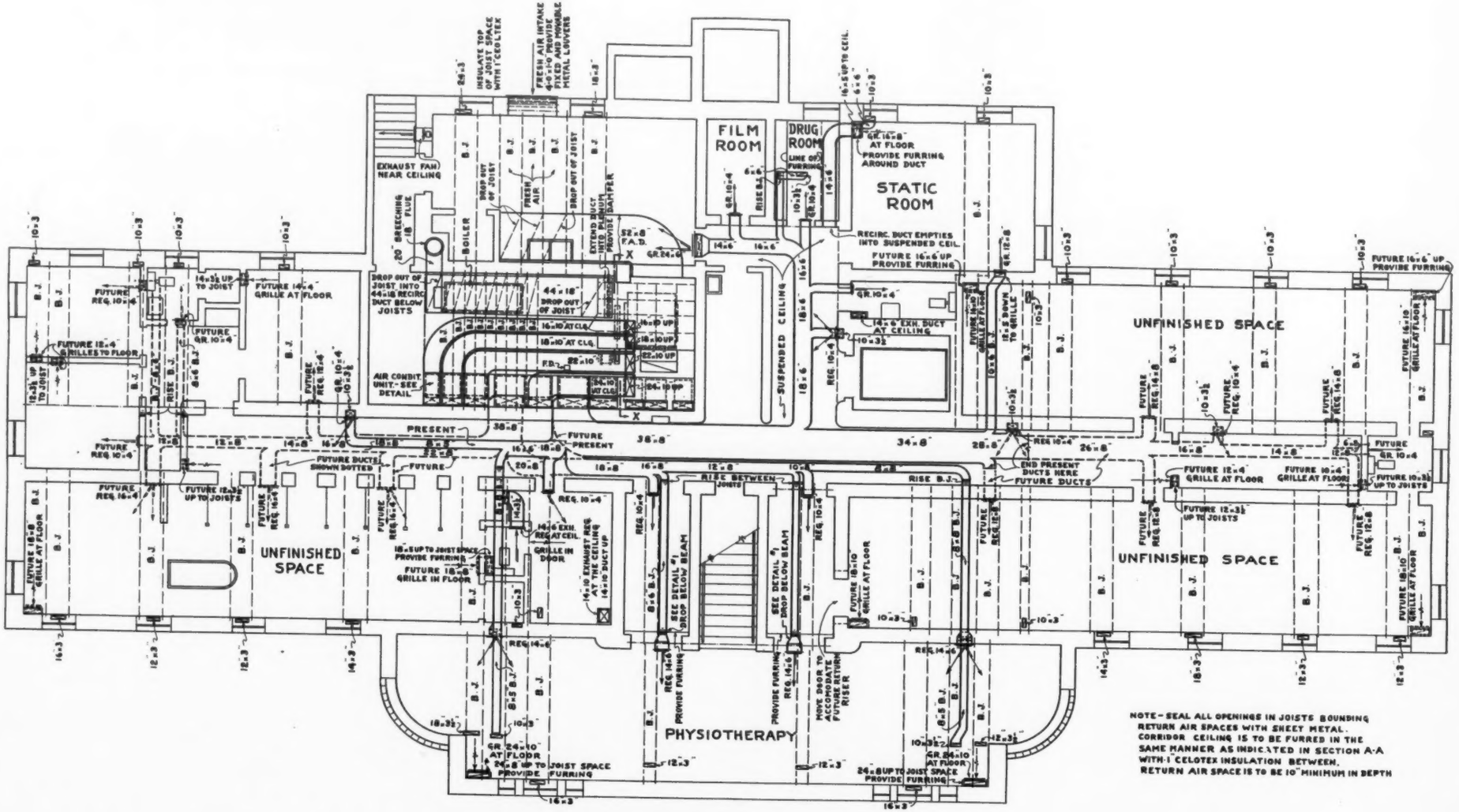
WHEN Dr. A. D. Allen, Bay City, Michigan, finished his work as an interne and started to practice he began to dream of a clinic where a number of doctors could pool their resources and have better equipment than would be possible for one doctor working alone. So he began to plan, and after he had been practicing a few years he purchased a large residence, converted it into offices using the living room as a waiting room and took on as associates two other doctors. In a few years there were six doctors and the old building was too small to hold the patients.

About this time Nurmi Builders, Inc., began making plans for a new clinic and shortly plans were completed except for one very important item, that of heating and ventilating. The E. C. Henry Company (formerly Gray-Henry Company) of Bay City, were called in and recommended that the building be heated with warm air, but some of the doctors were a bit skeptical. It was decided to call in a consulting engineer, so Mr. Eric Hyde of Giffels & Vallet, Inc., Detroit, was asked to assist in preparing plans. The building is modern in every respect and second to none in any country; the air conditioning system is thought to be modern in every detail.

There are ten suites of offices of four rooms each, besides a bookkeeping department, x-ray room, laboratories, operating room, sterilizing room, men's recovery room, women's recovery room, static room, physiotherapy, drug room, laundry, and lavatories. The building is built of 8-inch cinder blocks with glazed brick veneer, 2-inch air



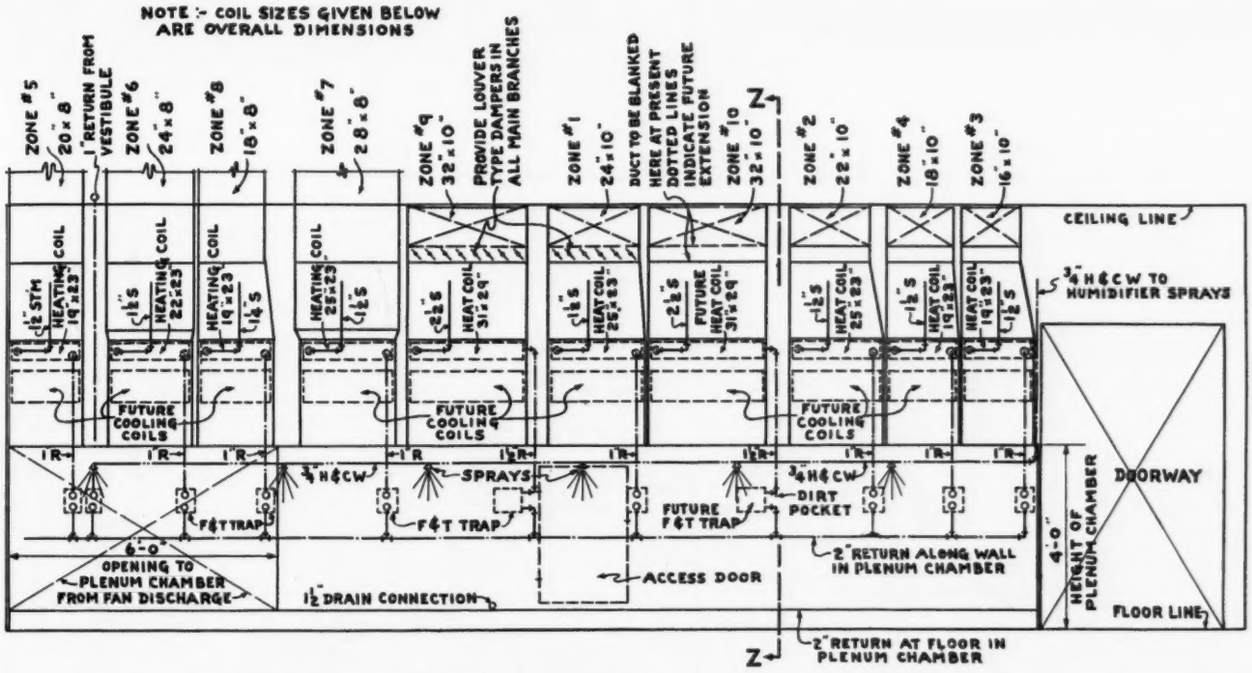
Heat is generated in the 2900-foot, gas-fired boiler. The 10-zone plenum (see boiler room elevation) is the sheet metal housing which just shows at the extreme left. The blower housing is shown on the front cover photograph.


FILM ROOM
DRUG ROOM
STATIC ROOM
UNFINISHED SPACE
UNFINISHED SPACE
UNFINISHED SPACE
PHYSIOTHERAPY
BOILER
EXHAUST FAN NEAR CEILING
FRESH AIR INTAKE 4'-5"x10" PROVIDE FIXED AND HOODED METAL LOUVERS
INSULATE TOP OF JOIST SPACE WITH 1" CELOTEX
SUSPENDED CEILING
RECIRC. DUCT EMPTIES INTO SUSPENDED CEIL.
FUTURE 16'-6" UP PROVIDE FURRING
AIR CONDIT. UNIT - SEE DETAIL
FUTURE DUCTS SHOWN DOTTED
PRESENT
FUTURE
END PRESENT DUCTS HERE FUTURE DUCTS
RISE BETWEEN JOISTS
RISE B.J.
SEE DETAIL #1 DROP BELOW BEAM
PROVIDE FURRING
NOTE - SEAL ALL OPENINGS IN JOISTS BOUNDING RETURN AIR SPACES WITH SHEET METAL. CORRIDOR CEILING IS TO BE FURRED IN THE SAME MANNER AS INDICATED IN SECTION A-A WITH 1" CELOTEX INSULATION BETWEEN. RETURN AIR SPACE IS TO BE 10" MINIMUM IN DEPTH

## BASEMENT PLAN

The basement plan above shows the layout of ducts in the basement corridor. Ducts shown in dotted line are not in place, but will be added later. Compare with boiler room elevation detail and first floor plan to visualize the lay-out of supply and return systems. On facing page (top) is the elevation of the boiler room taken through the plenum chamber showing the ten zones with individual coils and dampers; future cooling coils, spray humidifiers.

On facing page (below) detail of blower and filters and section through a typical coil unit.




ELEVATION OF NORTH WALL OF BOILER ROOM

space between block and brick with plastering on the blocks. The ceiling is plastered on 1-inch Celotex on steel joists with 2-inch insulating board on top of joists, then ½-inch concrete and a built-up roof. The windows are single glass, steel casement, opening out. The floors are of steel and concrete, and the entire building is of fireproof construction.

The heat loss of the building is figured at 469,764 Btu per hour and has a cubical content of 100,528. Due to the convenience of operation, and the low cost of gas (in Bay City 50c per thousand cu. ft. for 1080 Btu gas) it was decided to use gas for fuel and the system is designed for year around conditioning, although the cooling coils have been omitted for the time being.

### Air Distribution and Zone Operation

A gas-fired boiler is used with a capacity of 2900 sq. ft. There are ten zones in the building; two in the basement, four on the first floor, and four on the second floor. There is a blast coil for each zone with a motorized modulating valve, which is connected to the thermostat in the respective zone. The valve will change its position with the variation of 1/10 of one degree and will change from open to closed position in three degrees.

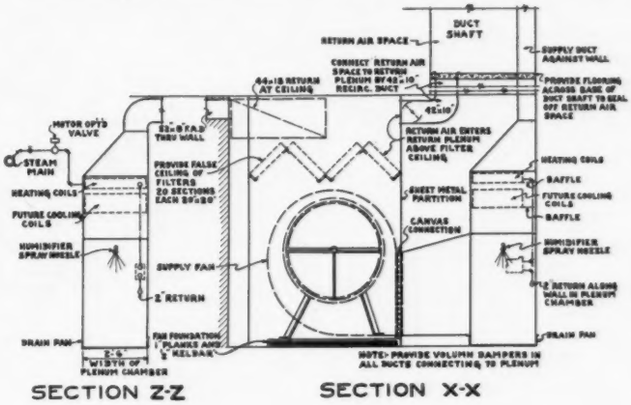
The blower runs at a very low speed using a 3 H. P. motor and delivers 10,000 cu. ft. of air at 0.6 S. P. When the cooling coils are added a 7½ H. P. motor may be installed and the blower speeded up so that it will deliver the proper amount of air for cooling. The air in the building is recirculated with the exception of the operating room, sterilizing room, x-ray room, laundry, lavatories, and laboratories. Air from these rooms is exhausted to the outside and fresh air is taken in through the system to replace the exhausted air. This keeps the building free of such odors as ether, tobacco smoke, etc. The air passes through a bank of dry filters and then passes through the blower into a plenum chamber where there are a series of spray nozzles which make a fine fog that washes and humidifies the air. The humidity is controlled by a hydrostat and solenoid valve. The air is circulated continuously throughout the building and is tempered by the blast coils to the right temperature.

The ceilings of the corridors have been dropped about 20 inches and in this space we have the warm air and cold air ducts. The warm air ducts are underneath the cold air ducts, and are separated with 1 inch of Celotex. There are splitter dampers in the main ducts and these are adjustable from the ceilings of the corridors.

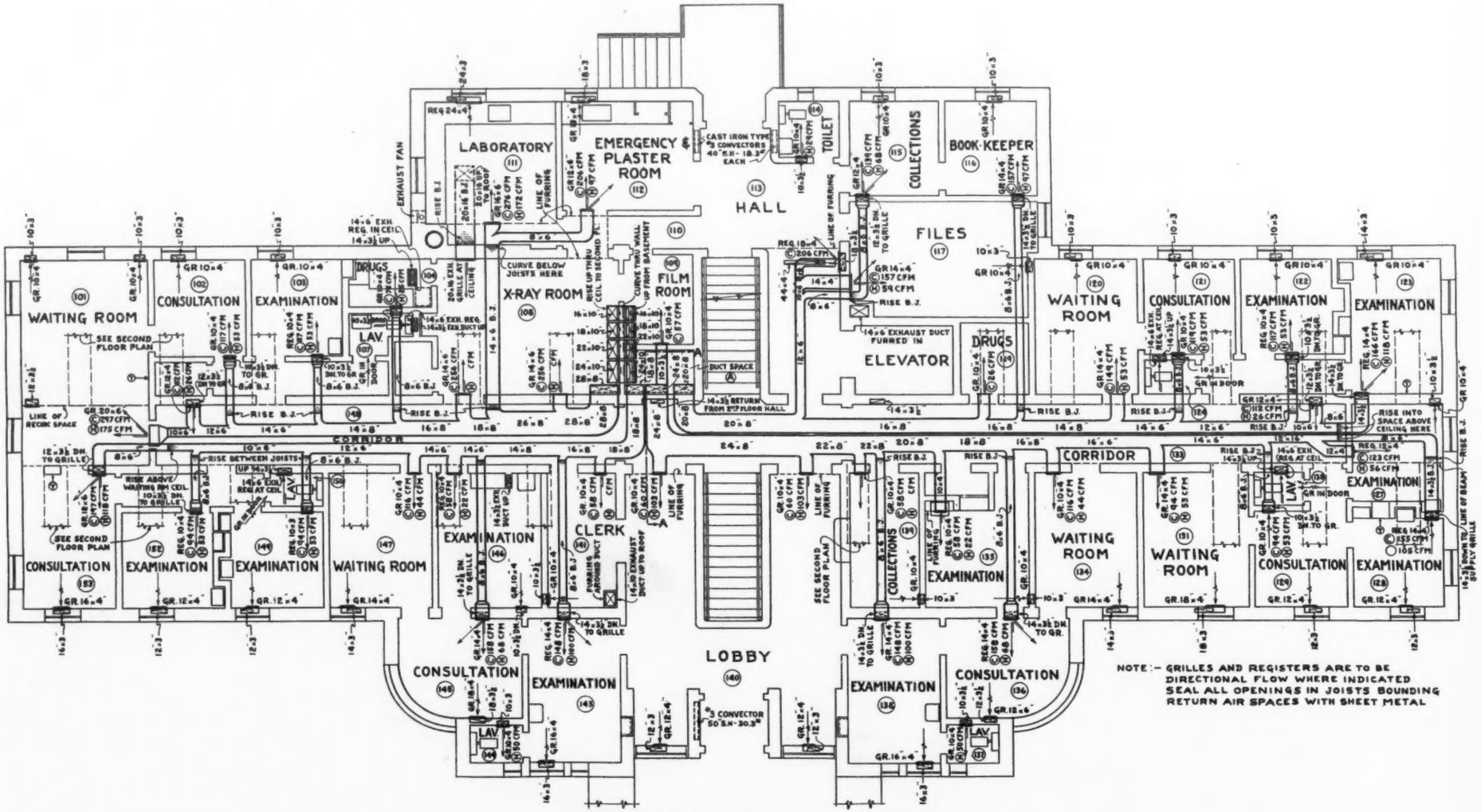
### Calculated and Actual Heating Costs

Last winter the system passed through a period of 5° below zero weather and all parts of the building were up to temperature. In talking with Dr. Allen, he stated that he thought the heating system was just about perfect.

Bay City has an average of 7,000 degree days; between the opening of the heating season and February 9, 1939, we had a total of 3,627 degree

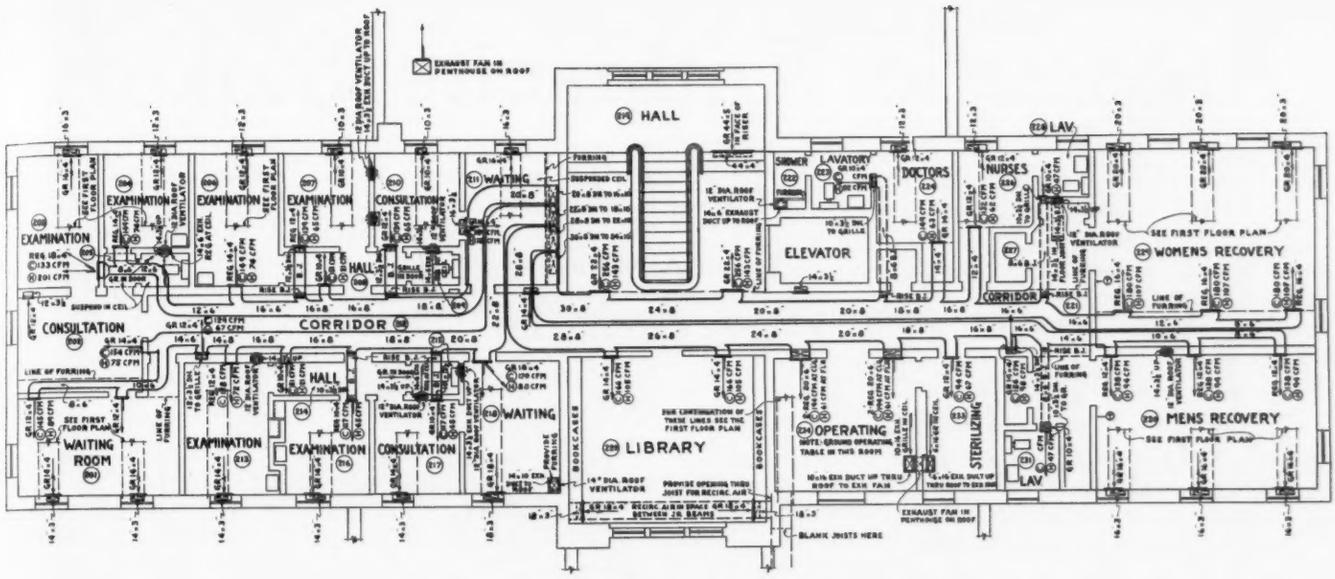

RETURN AIR SPACE
DUCT SHAFT
SUPPLY DUCT AGAINST WALL
CONNECT RETURN AIR SPACE TO RETURN PLENUM 8'-0"x10" RECIRC. DUCT
44"x18" RETURN AT CEILING
PROVIDE FLOORING ACROSS BASE OF DUCT SHAFT TO SEAL OFF RETURN AIR SPACE
42"x10"
MOTOR OP'D VALVE
STEAM MAIN
HEATING COILS
FUTURE COOLING COILS
HUMIDIFIER SPRAY NOZZLE
22"x8'-0" R.A.D. THRU WALL
PROVIDE FALSE CEILING OF FILTERS 20 SECTIONS EACH 20"x20"
RETURN AIR ENTERS RETURN PLENUM ABOVE FILTER CEILING
SHEET METAL PARTITION
CANVAS CONNECTION
HEATING COILS
BAFFLE
FUTURE COOLING COILS
BAFFLE
HUMIDIFIER SPRAY NOZZLE
SUPPLY FAN
2" RETURN
2" RETURN ALONG WALL IN PLENUM CHAMBER
DRAIN PAN
FAN FOUNDATION 1" PLANKS AND 2" KELSAN
DRAIN PAN
2'-6" WIDTH OF PLENUM CHAMBER
NOTE:- PROVIDE VOLUME DAMPERS IN ALL DUCTS CONNECTING TO PLENUM

SECTION Z-Z SECTION X-X




FIRST FLOOR PLAN

Above—first floor plan showing location of registers (heat) and returns; also runs of duct behind furred ceiling. Part of the second floor return system (under first floor ceiling) is shown, the other half of the return system is shown on the second floor plan. First floor return system is shown on the basement plan. On facing page (top) second floor plan again using corridor ceiling for ducts. On facing page (below) two details of the return system showing how air is taken out of room and arrangement of supply and return behind furred ceiling.




SECOND FLOOR PLAN

days. In this period a total of 708,200 cu. ft. of gas were consumed. This is 184 cu. ft. of gas per degree day or a total cost of $375.89. Projecting this for the season would give 1,288,000 cu. ft. of gas and a cost of $687.75 for the 1938-1939 heating season. This includes the Michigan sales tax. The actual cost of fuel was later found to be $599.56 for the period Nov. 9, 1938, to May 9, 1939.

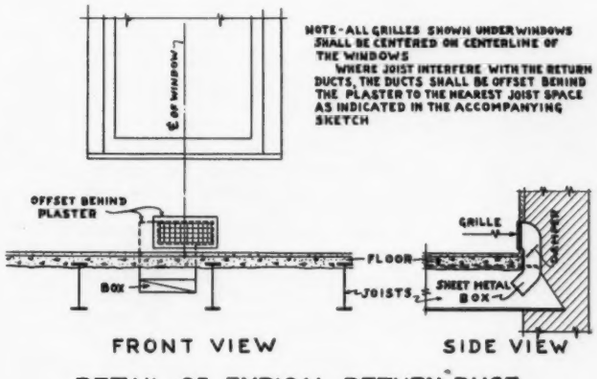
The plans show some areas of the basement as "future work" and here the partitions are not in place so the stacks were not set nor the basement pipe work connected.

Our work in the equipment room is shown in details Z-Z, X-X, and elevation of the furnace room. The photograph also shows the sheet metal work in this room. It will be noted that the warm air plenum is divided into zones, each zone with its heating coil; sprays are located here; and the dampers which control the volume of air passing into each zone. This plenum was fabricated complete in our shop.

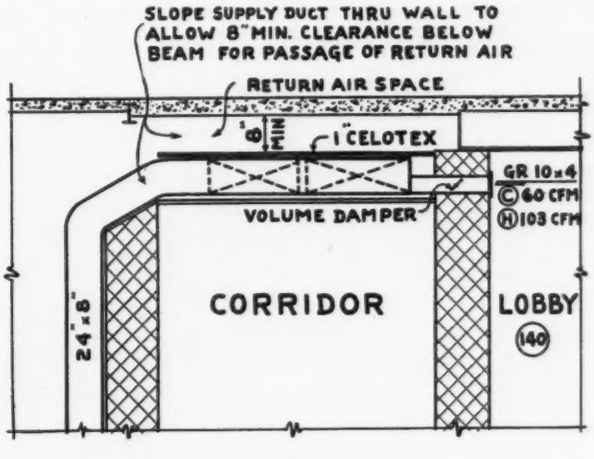
There may be some question about the supply and return runs. The detail A-A (first floor plan) shows how the ducts are run above a false ceiling in the corridor, with the return air above the supply. The air from the second floor is admitted to a space on the first floor between the first floor ceiling and the supply pipes. The air is then discharged into the space provided for the ducts right next to the stairway. On the basement plan and in section X-X there is a return duct from this duct shaft to the plenum chamber above the filters. This space is 42 by 10 inches. All air from the second floor is returned to the furnace room in this manner.

We were careful that our sheet metal work would fit and, accordingly, all work was measured up in the building before sections were fabricated. All duct work, register boxes, plenums and housings were fabricated in the E. C. Henry shop and delivered to the job as complete sections. There were no particularly difficult metal problems—the returns from the second floor crossing under the floor to the first floor corridor are straight duct sections; the warm air branches are all comparatively short since branches open directly from corridor ducts; the returns from the first floor are straight sections in the basement. There are no fittings in the returns except the dampered elbow (offset in many cases) shown in the detail. Since these elbows are

(*Continued on page 57*)


NOTE - ALL GRILLES SHOWN UNDER WINDOWS SHALL BE CENTERED ON CENTERLINE OF THE WINDOWS
WHERE JOIST INTERFERE WITH THE RETURN DUCTS, THE DUCTS SHALL BE OFFSET BEHIND THE PLASTER TO THE NEAREST JOIST SPACE AS INDICATED IN THE ACCOMPANYING SKETCH
℄ OF WINDOW
OFFSET BEHIND PLASTER
GRILLE
FLOOR
BOX
JOISTS
SHEET METAL BOX
FRONT VIEW
SIDE VIEW

DETAIL OF TYPICAL RETURN DUCT




SECTION A-A

# Automatic Anthracite Stokers

## [Part 2]

By Paul A. Mulcey

Assistant Director, Anthracite Industries Laboratory
Primos, Delaware County, Pa.

OBVIOUSLY, the first step to be taken before considering the actual installation of an anthracite burner is the careful selection of the equipment. A number of factors must be taken into account such as the choice between bin or hopper-feed units, whether or not mechanical ash removal should be used and other points relating to the physical layout of the cellar. In the installation of a conversion stoker in a warm air furnace, it is especially necessary to consider any possible obstacles which may be encountered in installation. As a matter of fact even after equipment has been selected, but before a stoker is actually brought into the cellar, it is advisable to check dimensions in detail. The reason for this is, of course, the desirability of causing the least disturbance to the casing or air jacket surrounding the ashpit.

The most important point to be considered in the selection of a stoker is the desired capacity. The actual heating requirements should be determined by a heat loss survey. This, taken with reasonable allowances for duct losses, heater efficiency and any other safety factors deemed necessary will give the coal consumption required. The next step is to find what size retort will permit this combustion rate and whether or not sufficient clearance will be available between the burner head and furnace walls for the spilling of ashes.

### Retort Size

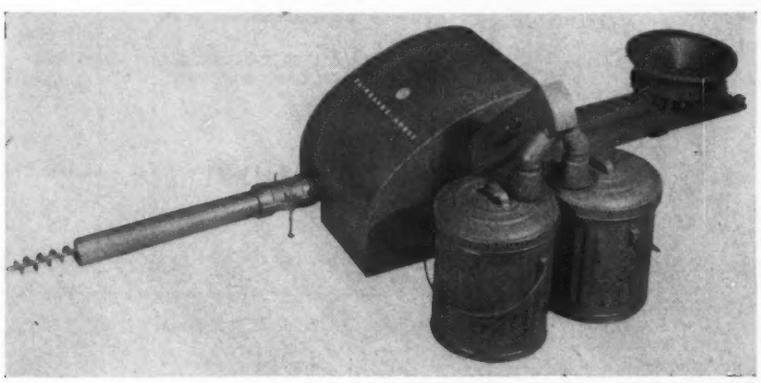
With the wide variety of underfeed anthracite stokers available, there is of course a relatively wide divergence in capacity. Average burners will have a burning rate of 15 to 16 lbs. of coal per sq. ft. of grate area per hour. This surface is calculated as the area of a horizontal circle of the same size as the outside diameter of the retort.

It is important to remember that although the burning rate may be the same on a spillover stoker as compared to a mechanical ash scraper type of burner, the clearance necessary is much smaller in the latter case. This permits the use of larger retorts (or conversely, smaller furnaces may be stokered) where mechanical agitation is available. For example, for stokers feeding up to 30 lbs. per hour, a minimum radial clearance of 2½ inches is required for spillover retorts, whereas considerably less clearance will be sufficient for a scraper or other type of agitator which imparts a positive motion to the refuse. In the matter of retort clearance as well as other factors relating to selection, it is always desirable to consult the manufacturer's recommendations.

In selecting a retort size for a conversion installation it is well to know approximately the maximum hand-firing burning rate at which the heater has been operated. Assuming that this rate was sufficient to care for this heating requirement, the stoker installed should have a potential combustion rate somewhat higher, say 25%.

### Setting Height

In most cases, there will be little latitude possible in determining the height at which the burner head will be set, nevertheless, it is well to point out that as far as burning efficiency is concerned, it is not necessary to take combustion volume into account when anthracite is burned. This is a result of the fact that one of the characteristics of hard coal is its complete lack of tarry matter so



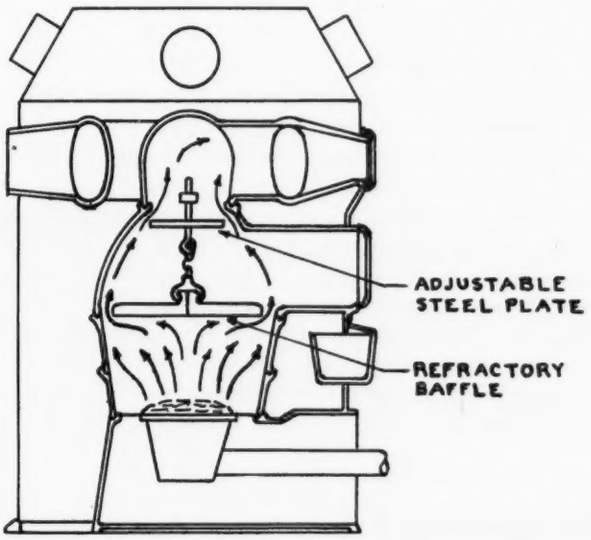
**Typical bin-feed, straight line, ash removing stoker for anthracite coal. In stokers of this type the coal bin, coal conveyor, stoker mechanism and the retort must form a straight line. The "Universal Type" in which the coal conveyor can be swung around the mechanism is more flexible.**

that the production of smoke and soot is impossible under any conditions.

In small furnaces it has sometimes been the practice to either pit the stoker or build a brick base under the furnace in order to eliminate the necessity for cutting through a casing wall as may be required in certain cases. The important point to remember is that any increase in temperature at the base of the return duct may result in a reverse chimney effect which in turn will introduce resistance to flow. This is particularly undesirable in gravity systems.

### Clearance

There are clearances other than that of the retort which should be carefully checked when selecting a stoker for warm air furnaces. In view of the fact that in practically all cases the distance from the center of the furnace to the outside of the casing is considerably greater than is the case with




**The "pancake" type of fire baffle is probably most common in furnaces. The purpose of the baffle is to stop the flame and radiant heat travel upward and direct them outward toward the prime heating surfaces. Special stoker furnaces obtain this result by adding much secondary heating surface.**

steam or hot water boilers, some stoker manufacturers list a "long model" which allows ample space between the mechanism and retort so that the external burner parts do not interfere with opening the firing door. If the installation is to be made through the ashpit door it should be made certain that there is sufficient clearance so that the metal parts of the stoker do not come in actual contact with the furnace. The purpose of this is to prevent the transmission of vibration. Some form of flexible or noise absorbing filler should always be inserted around air tubes and conveyors at the point where the stoker enters.

### Tight Joints Important

Owing to the fact that a stoker burns anthracite with a forced draft, no leakage between the combustion chamber and the air ducts is permissible. No stoker installation should be made unless the sections of the heater are completely sealed.

It is probable that many warm air furnaces go for years with small leaks between sections unnoticed. This is because there is a slight vacuum over the fire; whereas when a stoker is in operation there is always a slight pressure which may drive small particles of ash out through any openings which may be available. For this reason it is also necessary to seal up any cleanout doors and make certain that the fire door fits tightly.

### Baffles

Of all the non-routine problems encountered in stoker installation work, the least understood is probably that of baffle utilization.

In the first place, no device can accomplish a reduction in the overall rate of flow of gases through a given boiler or warm air furnace. The frequently heard phrase "bottling up the heat" means nothing when used in this connection. The products of combustion are released at a given rate from the fire and obviously the same number of pounds per minute move up the flue.

The real purpose of a baffle is to increase the rate of heat absorption from the products of combustion by the furnace and boiler walls. This is accomplished by bringing the gases into more effective physical contact with the combustion chamber walls, the prevention of short-circuits and stratification. On the other hand the advantages so realized may be off-set by the disadvantage of increased draft resistance which results from the use of baffles.

Laboratory tests have shown that the heat absorbed within the combustion chamber is reduced by approximately ⅓ when a heater is converted from hand-firing to stoker-firing. This puts an additional demand upon the secondary surface. When the latter is of sufficient capacity, there is no change in the total quantity of heat absorbed. If, on the other hand, the heater is of insufficient size to provide the necessary secondary surface, supplementary means must be provided to make the primary surface more effective.

Since a shortage of secondary surface is usually accompanied by low draft resistance, the added resistance of a properly designed baffle will not be objectionable in such cases.

To summarize briefly, a baffle when properly installed becomes an important part of the heater with the purpose of increasing the efficiency of the combustion chamber side walls in such a manner as to approximate or possibly even to better the thermal performance obtainable by hand-firing. The exact shape of baffle depends largely upon furnace design. However, since by far the majority of warm air heaters are of the round variety, the round horizontal "pancake" type is most prevalent.

### Stoker-Furnaces

For completely new installations, there are avail-

(*Continued on page* 90)

*Air Conditioning Facts From the Research Residence*

# Automatic Controls for Intermittent Fan Operation

By S. Konzo

Special Research Assistant Professor
Engineering Experiment Station
University of Illinois

AN extensive series of tests have been conducted in the Warm Air Heating Research Residence of the National Warm Air Heating and Air Conditioning Association dealing with various types of automatic control systems. Detailed reports of these investigations have been presented in the book entitled "Winter Air Conditioning—Forced Air Heating."

In the previous issue a discussion was presented of two types of control systems, which provide for continuous fan operation, as follows:

**A. Continuous fan operation. (See Fig. 1, Type I)**

1. Modulated bonnet air temperature with constant air delivery.
2. Modulated air delivery with constant bonnet air temperature.

In this issue, a discussion will be presented of control systems using **intermittent** fan operation. The three general types of such control systems may be classified as follows:

**B. Intermittent fan operation**

1. Automatic control of both the fan operation and the burner operation; so that the fan operated intermittently, and the burner on-periods occurred irrespective of whether or not the fan was running. (See Fig. 1, Type II.)
2. Automatic control of both the fan operation and burner operation; so that the fan operated intermittently, except during the burner on-periods when it was rendered totally inoperative. (See Fig. 1, Type III.)
3. Automatic control of both the fan operation and the burner operation; so that the fan operated intermittently, and the burner on-periods accompanied either all, or some fraction of each of the fan on-periods. (See Fig. 1, Type IV.)

Of these three types, the control system listed as B-2, and illustrated by Fig. 1, type III, has not proven successful and is no longer extensively used. For cases in which the pick-up in combustion rate was slow, the room air temperatures tended to drop four or five degrees below normal, since the fan was inoperative throughout the pick-up period. Both of the other two types provide better control of the

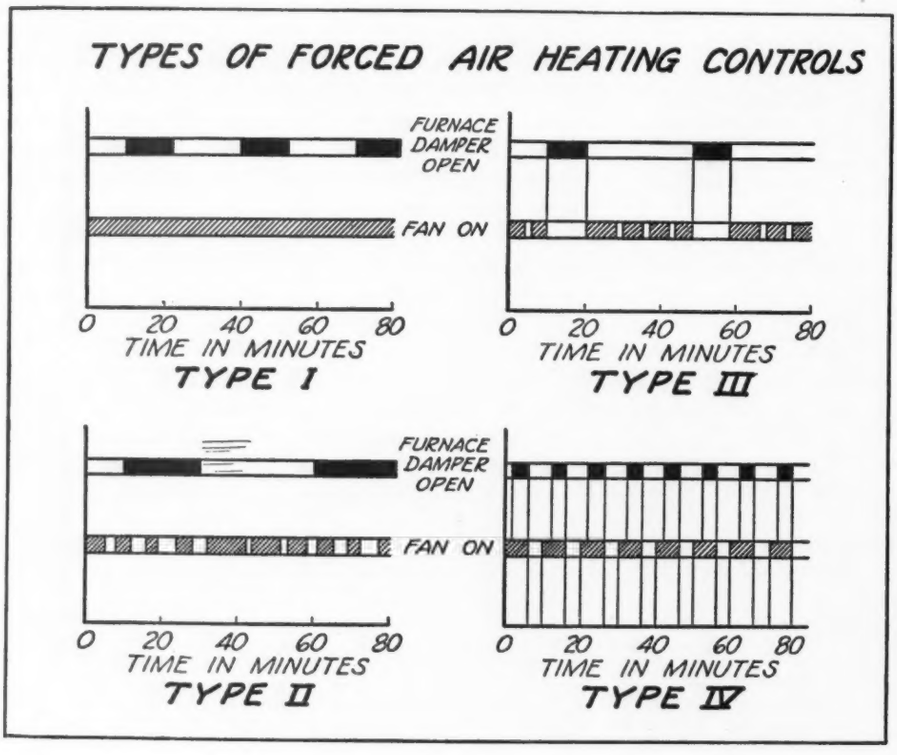
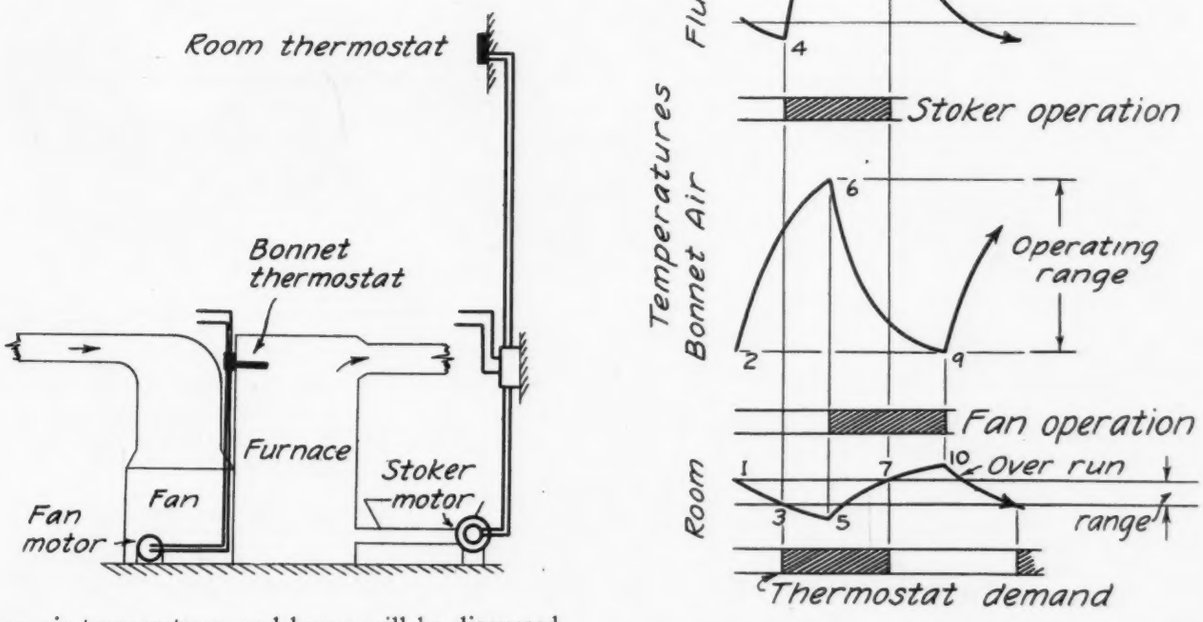



**Fig. 1—Four general types of controls for forced air heating systems charted for damper opening - fan operating sequence. (From Winter Air Conditioning, Forced Warm Air Heating, by S. Konzo.)**

Fig. 2—Wiring diagram and operating cycle for a simple control system. This system permits over-run and under-run of room temperature.




room air temperatures and hence will be discussed in greater detail.

### Operating Characteristics of Forced-Air System

The inherent and unique characteristics of a forced-air heating system should be appreciated if suitable control equipment is to be provided. These characteristics are:

1. Rapid response to heat demand. When the room thermostat calls for heat the room temperatures begin to rise within about ten seconds after the fan begins to operate.

2. Gravity heating action during off-periods of fan. The rooms on the second and third story are heated to some extent during the off-periods of the fan by gravity action. Uncontrolled bonnet air temperatures that deviate widely from a mean value

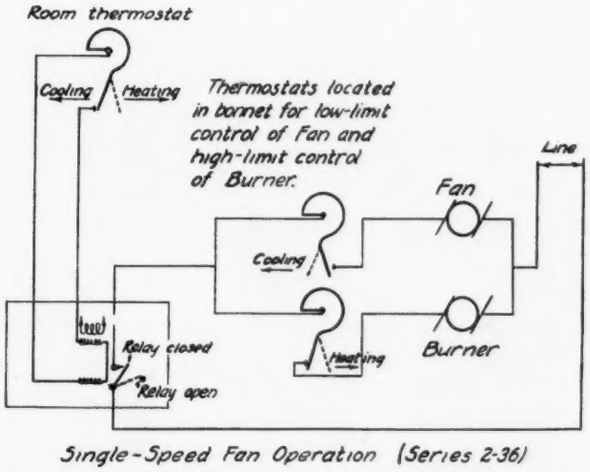



Fig. 3—Simplified wiring diagram for control system which the Research Residence staff has found most satisfactory for all fuels.

are not desirable, since the balance in the distribution of heat to various rooms in the house may be affected.

3. Generation of heat only as required. Long and infrequent operations of the heat generating device are not conducive to maintenance of uniform bonnet air temperatures. A reasonable amount of reserve heat is desirable, but in general the heat generation should be frequent and of short duration.

4. Maintenance of minimum combustion rate to satisfy demands. Rigid regulation of the bonnet air and room air temperatures can be obtained by controlling the combustion process so that the heat generated is a minimum which will just satisfy the demands of the house.

### B. Intermittent fan operation.

1. Automatic control of both the fan operation and the burner operation; so that the fan operated intermittently, and the burner on-periods occurred irrespective of whether or not the fan was running. (See Fig. 1, Type II.)

The line diagram in the left side of Fig. 2 shows a simple, and commonly used, control system in which a room thermostat controls the operation of the burner motor alone, and a bonnet thermostat controls the operation of the fan motor alone. The line diagram shown in the right side of Fig. 2 shows the sequence of events leading to over runs in the room air temperature. When the room air temperature is high (point 1), the room thermostat is satisfied. Since the bonnet air temperature is low point 2), the fan does not operate and the reserve heat in the bonnet causes the bonnet air temperature to rise. When the room temperature falls and the room thermo-

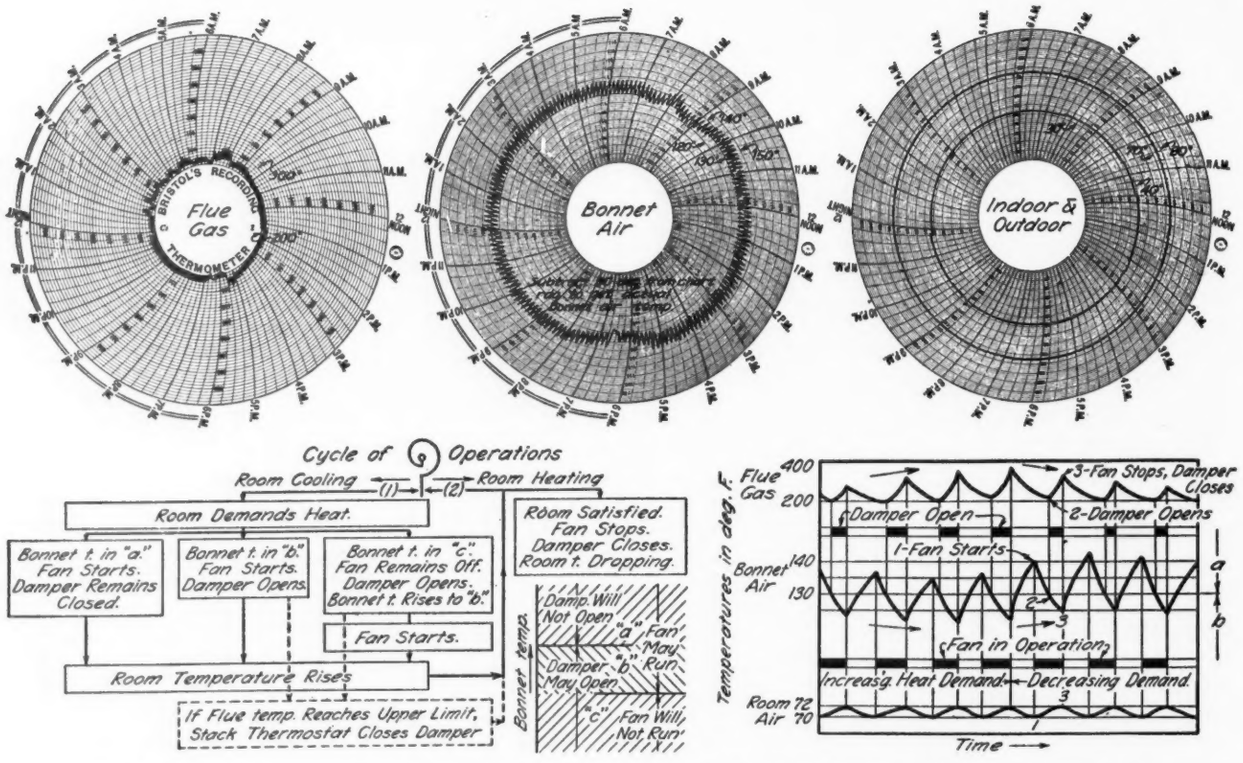



**Fig. 4—Temperature records and operating diagrams for controls permitting intermitting fan operation. This is for the system shown in Fig. 3—the best universal hookup investigated in the Research Residence.**

stat demands heat (point 3), the burner begins operating (point 4). The room temperature falls below sub-normal (point 5) until the bonnet air temperature has risen to a temperature high enough to start the fan (point 6). The fan operates until the temperature in the bonnet is reduced to the lower limit (point 9), resulting in a over run in room temperature (point 10). The burner stops operating (point 8) when the room temperature has risen to the temperature indicated by point 7.

Simplicity is to be desired, but in this case is achieved with a sacrifice in performance since the room air temperatures are allowed to fall below and over run the desired value and an appreciable lag exists between the time the room thermostat demands heat and the circulating fan begins to operate.

The fluctuations in room air temperatures are large for coal fired plants having a large reserve of heat in both the furnace and the fuel bed. This control method is better adapted to gas-fired and oil-fired furnaces, particularly those having a small reserve of heat in light weight furnace construction. Since temperature over-runs of two or three degrees are not usually noticed, while any temperature deviation below the comfort temperature is extremely objectionable, it has been found desirable in most cases to adjust the setting of the room thermostat so that at no time does the room temperature fall to a value causing discomfort.

**B. Intermittent fan operation.**

3. Automatic control of both the fan operation and the burner operation; so that the fan operated intermittently, and the burner on-periods accompanied either all, or some fraction of each of the fan on-periods. (See Fig. 1, Type IV.)

The extensive investigation of automatic controls conducted in the residence has shown that the control arrangement shown in modified form in Fig. 3 is most satisfactory for forced-air heating systems utilizing solid, liquid, or gaseous fuels. The typical operating charts shown in Fig. 4 illustrate the exact control maintained over the room air, bonnet air, and flue gas temperatures during normal operation. The four conditions of operation which may be encountered and for which the controls

(*Continued on page* 94)

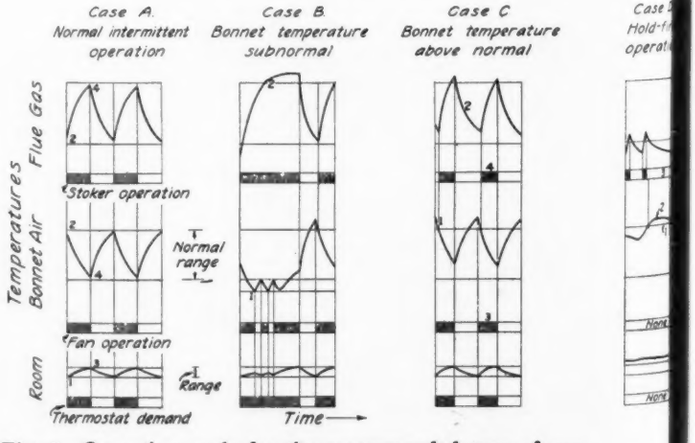



**Fig. 5—Operating cycle for the recommended type of control system. The "cases" show what takes place under the four possible conditions of the system.**

# Building Insulation; Types and Applications

**Paper delivered by S. Konzo at the Second Air Conditioning Conference, University of Illinois, Urbana, Illinois, March 8 and 9, 1939. This is Part 2; Part 1 appeared in the October issue.**

### Insulation of Ceiling

CURVES of the heat transmission coefficient and the percentage of reduction for a ceiling, both unfloored and floored above it, are shown in Fig. 5 (see Appendix Section (e)). The values shown in Fig. 5 apply however, only to cases in which the attic air temperature has a *constant* value, regardless of the thickness of insulation applied to the ceiling joists. This condition might be approximated only in a well-ventilated attic in which the attic air temperature was practically the same as the outdoor air temperature. The coefficients shown in Fig. 5 can be used in the following equation of heat loss:

$$H = A_c \times U_c \times (t_i - t_a)$$

If this equation is to be used an estimate of the attic temperature, $t_a$, should be made. Table 5 in the Appendix Section (e) is suggested for use in this connection.

In most cases, and especially for unventilated attics, the air temperature in the attic space does not have a constant value, and is dependent not only on the nature and shape of the roof construction, but also on the amount of insulation applied to the ceiling joists (see Appendix Section (f)). The calculation of the heat loss through the ceiling (and roof) can be made by considering the ceiling and roof structure as an integral unit, and using a combined value of the overall heat transmission coefficient in the heat loss equation:

$$H = A_c \times U_{com} \times (t_i - t_o)$$

The values of $U_{com}$ can be derived from an equation similar to that in Appendix Section (f), or from Fig. 9 in the text.

The combined coefficients for a typical roof and ceiling construction for varying thicknesses of insulation applied to the ceiling joists are shown in Fig. 6 (see Appendix Section (g)). As in the case of Fig. 2, approximately 2 in. of insulation are required to reduce the combined coefficient of roof and ceiling to a value less than 0.1 B.t.u. per hr. per sq. ft. per deg. F. The values shown in Figs. 2, 5, and 6 indicate that substantial reductions in the heat transmission coefficient can be effected by the use of adequate insulation.

### Effectiveness of Ceiling or Roof Insulation

"In general, unless the attic space is to be used for living quarters, insulation should be applied to the ceiling joists rather than to the roof rafters, as can be shown by two examples.—A comparison of the values of the combined coefficients of roof and ceiling will indicate whether

(a) ½ in. of rigid insulation applied to a plain unfloored ceiling will be more effective than ½ in. of rigid

## Appendix—Equations of Heat Transmission

**(e) Insulation Applied to Typical Ceiling.—**

A typical ceiling was considered as having a coefficient of heat transmission of 0.620 B.t.u. (no flooring over ceiling joists) and 0.286 B.t.u. (one inch flooring over ceiling joists).

TABLE 5
ASSUMED ATTIC TEMPERATURES IN DEG. F.

| Ceiling Coefficient $U_c$ | Attic Temperature, $t_a$ when outdoor temperature is | | |
|---|---|---|---|
| B.t.u. per hr. | 0 deg. F. | —10 deg. F. | —20 deg. F. |
| 0.6 | 35 | 30 | 25 |
| 0.5 | 32 | 26 | 21 |
| 0.4 | 28 | 22 | 15 |
| 0.3 | 23 | 16 | 9 |
| 0.2 | 17 | 10 | 2 |
| 0.1 | 10 | 1 | —8 |

Notes: Calculations based on ceiling temperature of 75 deg. F., roof pitch = ⅛, roof construction having $U$ value of 0.56 B.t.u. per hr., no allowance for ends of roof, window leakage in attic space, or heating effect of chimneys.

No flooring over joists

$$U_c = \frac{1}{\frac{1}{f_i} + \frac{1}{C_p} + \frac{x}{k} + \frac{1}{f_o}}$$

$$U_c = \frac{1}{\frac{1}{1.65} + \frac{1}{2.5} + \frac{x}{0.27} + \frac{1}{1.65}} = \frac{1}{1.612 + \frac{x}{0.27}}$$

1-in. flooring over joists

$$U_c = \frac{1}{\frac{1}{f_i} + \frac{1}{C_p} + \frac{x}{k} + \frac{1}{C_a} + \frac{x_f}{k_f}}$$

$$U_c = \frac{1}{\frac{1}{1.65} + \frac{1}{2.5} + \frac{x}{0.27} + \frac{1}{1.1} + \frac{0.78}{0.80}} = \frac{1}{3.497 + \frac{x}{0.27}}$$

These coefficients are to be used in the equation

$$H_c = U_c \times A_c \ (t_i - t_a)$$

in which

$A_c$ is the area of ceiling surface, in sq. ft.

$t_i$ is the temperature of air near ceiling, in deg. F., and

$t_a$ is the temperature of the attic, in deg. F.

It should be noted that in using this equation the value of $t_a$ must be estimated. Estimated attic temperatures for typical roof and ceiling construction are presented in Table 5.

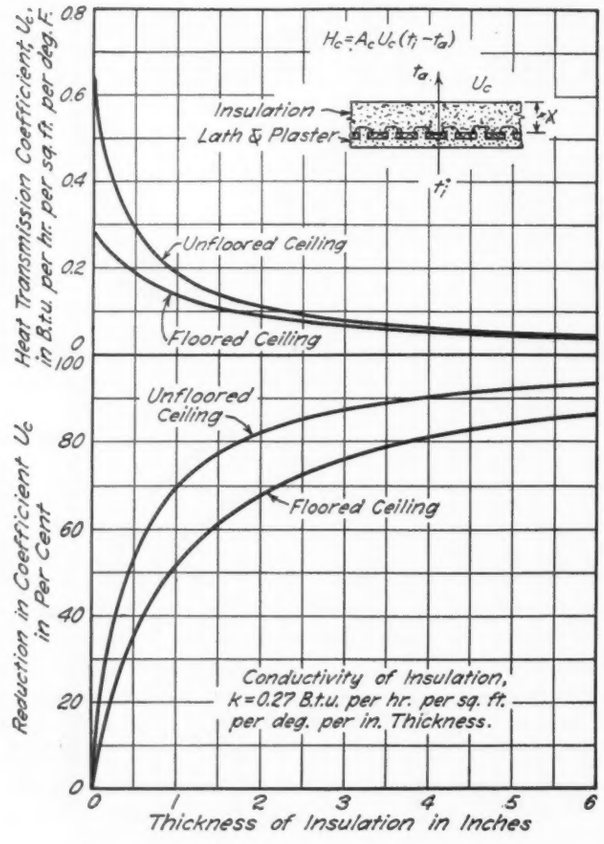

Heat Transmission Coefficient, Uc, in B.t.u. per hr. per sq. ft. per deg. F.
Reduction in Coefficient Uc in Per Cent
Hc=Ac Uc (ti-ta)
ta
Uc
Insulation
Lath & Plaster
X
ti
Unfloored Ceiling
Floored Ceiling
Unfloored Ceiling
Floored Ceiling
Conductivity of Insulation, k=0.27 B.t.u. per hr. per sq. ft. per deg. per in. Thickness.
Thickness of Insulation in Inches

**Fig. 5—Insulation Applied to Typical Ceilings**

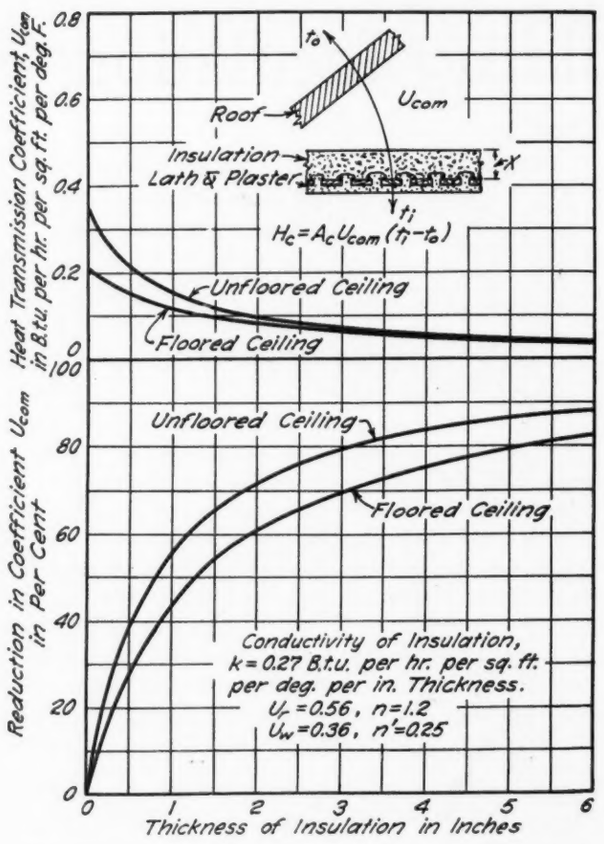



**Fig. 6—Insulation of Typical Ceiling-Roof Combination**

insulation applied to the rafters of a normal roof construction,

(b) 2 in. of fill insulation applied to an unfloored ceiling will be more effective than 2 in. of fill insulation applied to the roof rafters."

The numerical examples used in the solution of these two cases are given in Appendix Section (h).

In case (a) in which the original ceiling had a higher $U$ coefficient than the original roof, the heat loss was less when the ½-in. rigid insulation was applied to the ceiling ($U_{com}$ = 0.188 B.t.u.) than when the ½-in. rigid insulation was applied to the roof rafters ($U_{com}$ = 0.202 B.t.u.). Due to the fact that the ceiling area is smaller than the roof area, a smaller amount of the same thickness of insulation was applied to the ceiling as compared with that applied to the roof. In example (b) the results were substantially in agreement with those of example (a). The combined coefficient when the 2 in. of fill insulation was applied to the unfloored ceiling ($U_{com}$ = 0.097 B.t.u.) was less than that when the 2 in. of fill insulation was applied to the roof rafters ($U_{com}$ = 0.110 B.t.u.). In this case 12 per cent less heat would be lost when the ceiling was insulated as compared with that lost when the roof was insulated, and this was ac-

## Appendix—Equations of Heat Transmission

**(f) Combined Coefficient of Roof and Ceiling—**

"Another method of calculating the heat loss through the ceiling (and roof) is that in which the ceiling and roof structure are considered as an integral unit, and the heat transfer coefficient, $U_{com}$, is a combined coefficient. In this case the heat loss equation is

$$H = U_{com}\, A_c\, (t_c - t_o)$$

in which

$A_c$ is the area of ceiling surface, in sq. ft.
$t_c$ is the temperature of air near ceiling, in deg. F., and
$t_o$ is the temperature of outdoor air, in deg. F.

The values of $U_{com}$ may be obtained from the following equation, and is shown in graphical form in Fig. 9.

$$U_{com} = \frac{U_r U_c}{U_r + U_{c/n}}$$

in which

$U_r$ and $U_c$ are the coefficients for roof and ceiling, and
$n$ is the ratio of roof area to ceiling area."

The values shown in Fig. 9 are based on $n = 1.2$.

**(g) Combined Coefficient of Heat Transmission of Ceiling and Roof with Various Thicknesses of Insulation Applied to Ceiling Joists.—**

The values shown in Fig. 6 were calculated from an equation similar to that in Section (f), except that the end effects of the roof were also included.

$$U_{com} = \frac{U_c(nU_r + n'U_w)}{U_c + (nU_r + n'U_w)}$$

in which

$n$ is the ratio of roof area to ceiling area.
$n'$ = ratio of end wall area to ceiling area,
$U_c$, $U_r$, $U_w$ are the coefficients for ceiling, roof and end wall in roof, respectively.

A typical wall was assumed having roof pitch of ⅓, $n = 1.2$, $n' = 0.25$, $U_r = 0.56$, and $U_w = 0.36$ $U_{com}$ simplifies to

$$U_{com} = \frac{0.762U_c}{0.762 + U_c}$$

The values of $U_c$ in the equation for various thicknesses of insulation applied to the ceiling joists were obtained from Fig. 5. The values of $U_{com}$ were then plotted as shown in Fig. 6.

CALCULATED HEAT LOSSES FOR TYPICAL RESIDENCE

| Case | Insulation Wall | Insulation Ceiling | Weather Strip | Storm Sash | Calculated Hourly Heat Loss in Per Cent of Maximum Rate (0 20 40 60 80 100) | Reduction, % |
|---|---|---|---|---|---|---|
| a | None | None | None | None | | 0 |
| b | 1-in. | None | None | None | | 12.8 |
| c | 2-in. | None | None | None | | 17.4 |
| d | 3-in. | None | None | None | | 19.7 |
| e | 3⅝-in. | None | None | None | | 20.3 |
| f | None | 1-in. | None | None | | 11.3 |
| g | None | 2-in. | None | None | | 13.3 |
| h | None | 3-in. | None | None | | 14.1 |
| i | None | 3⅝-in. | None | None | | 14.5 |
| j | 3⅝-in. | 3⅝-in. | None | None | | 34.8 |
| k | None | None | Yes | None | | 9.0 |
| l | None | None | None | Yes | | 31.3 |
| m | 3⅝-in. | 3⅝-in. | None | Yes | | 66.1 |

**Fig. 7—Calculated Heat Losses for Typical Residence**

complished with approximately 20 per cent less insulation.

Therefore, for the same total amount of insulation applied, greater effectiveness can be obtained by placing it in the ceiling joists rather than in the attic rafters. A consideration of summer operating conditions, in which attics are commonly ventilated and the attic air temperatures are extremely high, tends to confirm this recommendation.

## Calculated Reduction in H. L. for Typical Residence

Calculated values of the reduction in heat loss for a "typical" residence structure have been reproduced from a previous paper in which complete details of the calculations are presented. For these calculations it was assumed that the total heat loss for the "typical" house during maximum weather conditions was 100,000 B.t.u. per hour, composed of

a roof loss of 16,200 B.t.u. per hr.,
a wall loss of 27,000 B.t.u. per hr.,
a glass loss of 25,800 B.t.u. per hr.,
an infiltration loss of 24,600 B.t.u. per hr.,
a door loss of 4,300 B.t.u. per hr., and
a floor loss of 2,100 B.t.u. per hr.

Furthermore, the overall heat transmission coefficients for the uninsulated walls and ceilings were assumed to be respectively 0.245 and 0.62 B.t.u. per hr. per sq. ft. per deg. F. The reductions in heat loss effected by the addition of 1, 2, 3, and 3⅝ in. of insulation having a thermal conductivity of 0.27 B.t.u. per hr. per sq. ft. per deg. F. per in. of thickness are shown in Fig 7.

In the case of the wall insulation, reduction in heat loss amounting to 17.4 per cent (case *c*) was obtained when a thickness of 2 in. of insulation was used in the studding space. Similarly, in the case of the ceiling insulation, a reduction in heat loss amounting to 13.3 per cent (case *g*) was obtained when a thickness of 2 in. of insulation was used in the joist space. It should be recognized that the amount of insulation required for insulating the ceiling is materially less than that for insulating the sidewalls of the house. Hence, if a choice exists between insulating the wall or insulating the ceiling, the latter should be selected since the returns are greatest in proportion to the investment required. When a layer of insulation 2 in. thick was added to both the sidewalls and ceilings, the total reduction in heat loss from the house amounted to 30.7 per cent. A reduction in the heat loss from the structure amounting to 62.0 per cent was obtained when both the sidewalls and ceilings were insulated with a 2 in. thickness of insulation, and the house was completely equipped with storm windows and storm doors.

It is probable that these calculated reductions in heat loss, which were based on maximum load conditions, may not exactly correspond to the fuel saving obtainable under ordinary weather conditions. The calculated values should only be regarded as maximum savings obtainable under conditions of full load. On the other hand, the calculated values for reduction of heat loss take no account of the change in comfort conditions resulting from the increases in temperature of the wall surfaces exposed to the occupant, the increase in air temperature in the living zone, and the reduction of

(*Continued on page* 96)

## Appendix—Equations of Heat Transmission

**(h) Insulation of Ceiling or Roof.—**

(See Fig. 9.)

Example (a)

Given:

(1) Ceiling of metal lath and plaster, $U_c = 0.69$
(2) Same ceiling with ½ in. rigid insulation, $U_c = 0.26$
(3) Roof of asphalt shingles on sheath, $U_r = 0.56$
(4) Same roof with ½ in. rigid insulation, $U_r = 0.238$
(5) Roof pitch = ⅓, ratio of roof area to ceiling area = 1.2

Solution:

Combined coefficient of ceiling and roof for ceiling No. 1 and roof No. 4 = 0.202 B.t.u. per hr. per sq. ft. per deg. F. Same for ceiling No. 2 and roof No. 3 = 0.188 B.t.u. per hr. per sq. ft. per deg. F.

Example (b)

Given:

Same conditions as in Example (a) except that 2 in. of fill insulation was applied separately to the unfloored ceiling and to the roof.

Solution:

The combined coefficients were 0.110 B.t.u. and 0.097 B.t.u. respectively, when the roof and ceiling were insulated.

TABLE 6

TRUE COOLING EFFECT OF THREE COLD WALLS

| Wall Temperature deg. F. | Cooling Effect deg. F. dry-bulb |
|---|---|
| 70 | 0 |
| 65 | 1.2 |
| 60 | 2.5 |
| 55 | 4.0 |
| 50 | 5.8 |
| 45 | 8.9 |

**(i) Surface Temperature of Inside Wall and Ceiling.—**

The heat transmitted through the entire wall or ceiling is equal to the heat transmitted through the inner film from the surface of the wall or ceiling to the indoor air. That is

$$UA(t_i - t_o) = f_i A(t_i - t_s)$$

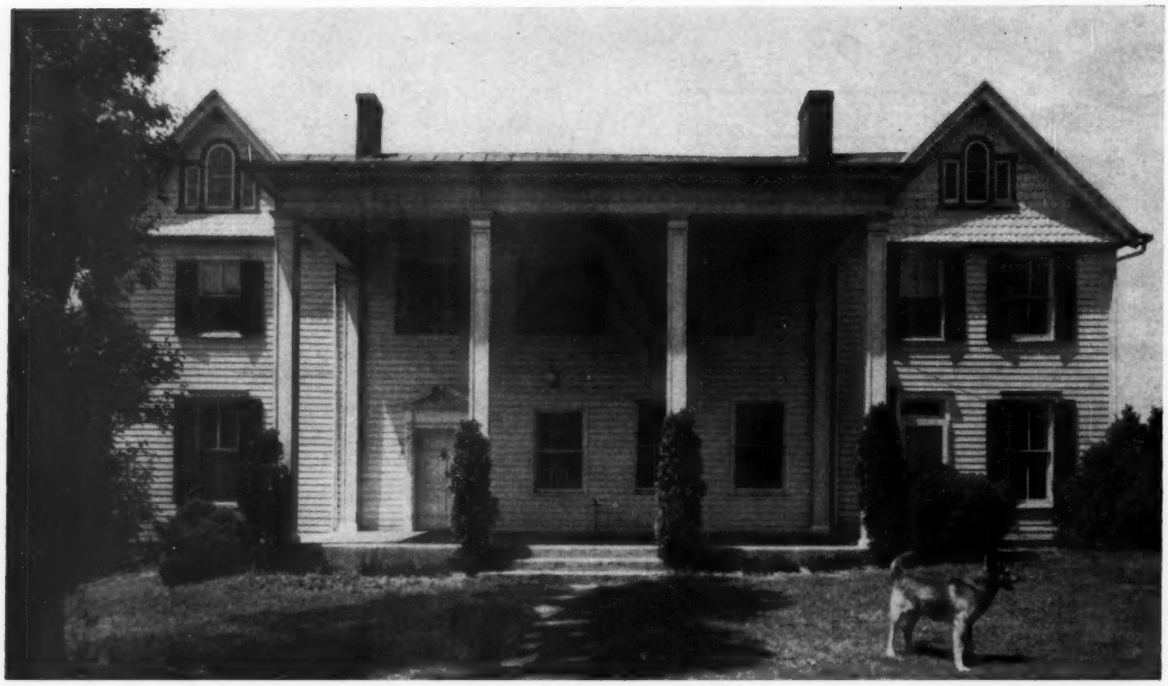
in which $t_i$, $t_o$ and $t_s$ are temperatures of indoor air, outdoor air, and inside surface of wall or ceiling, respectively.

For an indoor air temperature of 70 deg. F., and an outdoor air temperature of 0 deg. F., the equation becomes

$$UA(70 - 0) = 1.65A(70 - t_s), \text{ or}$$

$$t_s = \frac{70(1.65 - U)}{1.65} = 70 - 42.42U$$

The values of $U_w$ for the wall were obtained from Fig. 2, and those for the ceiling, $U_c$, were obtained from Fig. 6.



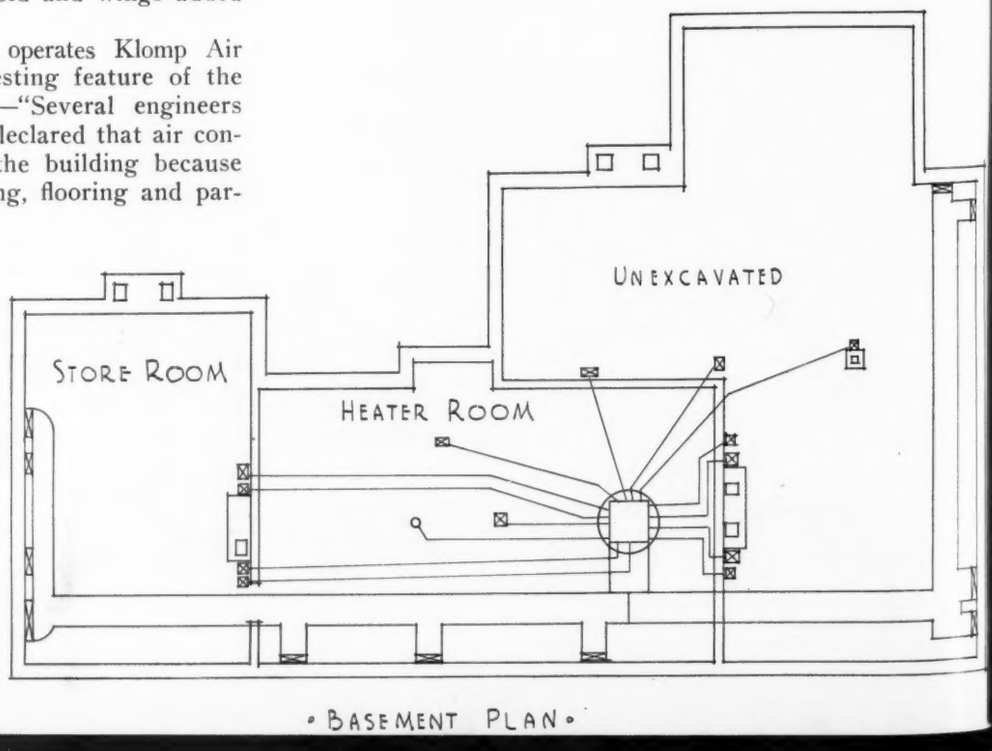
*Competitors said this house could not be air-conditioned, but Klomparens found the way with*

# Floor Registers, and Disguised, Exposed Stacks

IN THE mountains of Maryland, Klomp Air Systems of Washington, D. C., recently completed the installation of a forced air, oil burning, winter air conditioning system in a house with a main portion over 200 years old and wings added some 100 years later.

Mr. Roy Klomparens, who operates Klomp Air Systems, says that the interesting feature of the installation is the fact that—"Several engineers who had inspected the house declared that air conditioning was impossible in the building because the construction of the framing, flooring and partitions prevented any possibility of running ducts to the many rooms shown in the plans.

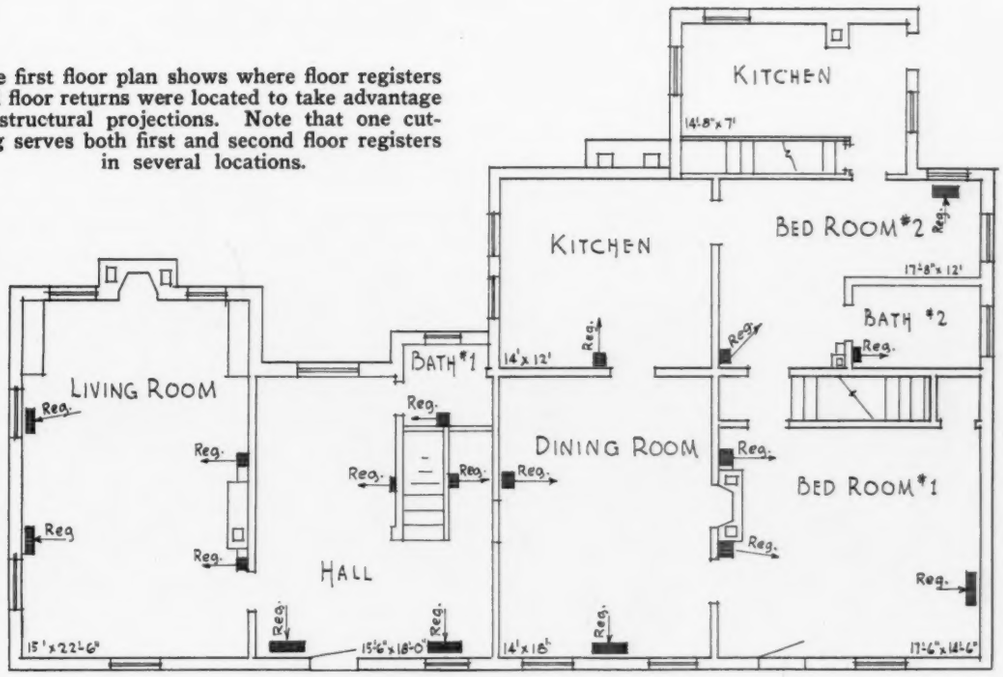
"The framing of the main area was built of 8x12-




• BASEMENT PLAN •

**Above—The central portion of the house is 200 years old; the wings 100 years old. There was no basement so an area for the furnace had to be dug as shown in the basement plan at the right. All supplies are round pipe, but returns are rectangular sections.**

The first floor plan shows where floor registers and floor returns were located to take advantage of structural projections. Note that one cutting serves both first and second floor registers in several locations.




•FIRST FLOOR PLAN•

inch hand hewn, white oak logs. The rooms of the 200-year old portion and of the wings were all wood panelled as in Colonial days. There was no cellar under any part of the house—through its long life the house rested on the ground, despite which there was no visible deterioration.

### Some Basement Problems

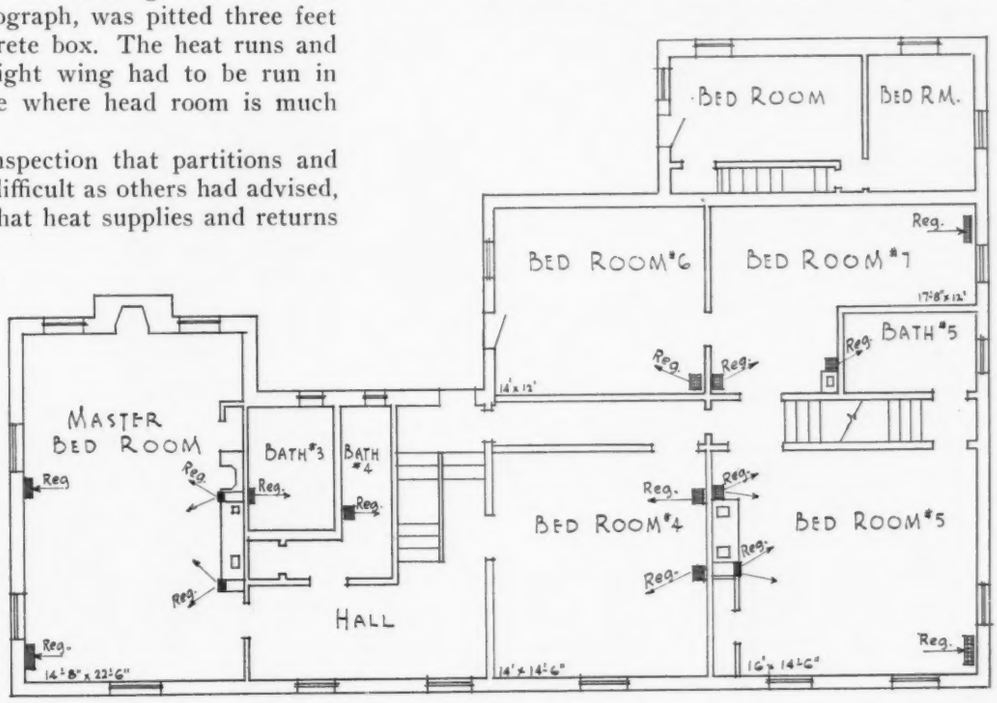
"In order to install the air conditioning system, it was necessary to excavate a heater room and the store room shown on the basement plan. Columns were used to support the building. The furnace, as shown in the photograph, was pitted three feet in a water-proof concrete box. The heat runs and returns serving the right wing had to be run in the unexcavated space where head room is much restricted.

"We found upon inspection that partitions and framing were just as difficult as others had advised, so we recommended that heat supplies and returns serving the second floor should be run inside the rooms of the first floor. Since there seemed to be no other way, the owner consented to this providing the paneling would not be injured and after runs were installed original and duplicate paneling or plaster would be placed so that the appearance of the rooms would not be changed.

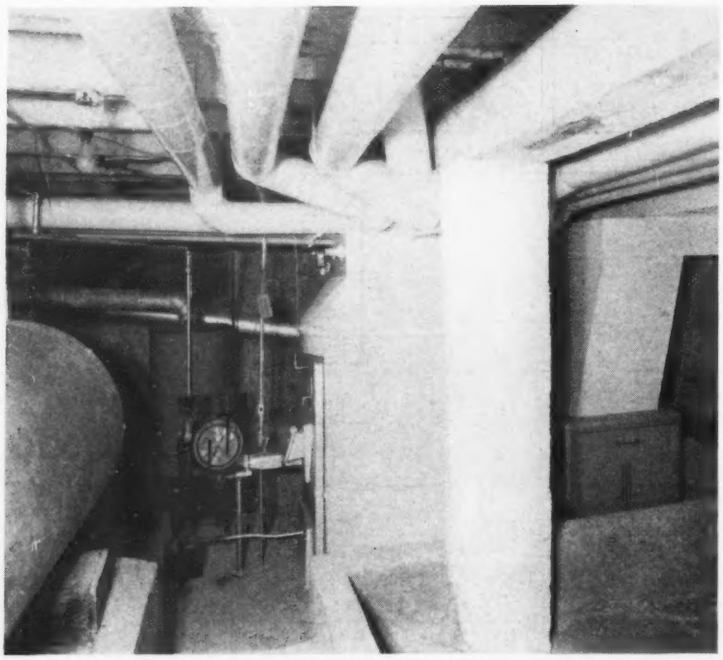
### Disguising Furred-Out Stacks

"We believed that with some careful selection of wall areas, these second floor runs could be made to blend naturally into the refinished walls. We

The second floor plan, compared with the first floor plan, above, gives a clear picture of the locations chosen to keep exposed stacks as unobtrusive and few as possible. Despite the inability to use partitions, there is a generous number of registers and returns on both floors.




•SECOND FLOOR PLAN•



**Left—Heat is supplied by a McIlvaine oil burner using five stages of flame so that heat generation is practically constant. The blower runs continuously. It is therefore expected that room conditions will be practically stable.**

◆

also recommended that double-headed stacks would save much cutting and further assist in keeping exposed runs at a minimum.

### Plans Show Stack Locations

"The result of our planning can be seen in the floor plans. Second floor registers were cut through the hand hewn beams with chisels (one of the laborious jobs). The projection of the fireplace in bed room number 1 on the first floor was utilized to run the stacks to bed rooms 4 and 5 on the second floor (double head). The old chimney and the corner behind the door in bed room number 2 were utilized for encased stacks to bath number 5 and bed room number 6.

"The projection of the fireplace in the living room was used, as in bed room number 1, to get stacks to the master bed room where a built-in wardrobe had to be crossed under as shown and a double-head added for bath number 3. The returns from the master bed room through the living room could not be hidden behind any existing structural part so the riser was encased and paneled and serves as a pilaster.

### Individual, Round Pipe Supply

"Since the basement is for heating service only, individual round pipes were recommended as shown in the photographs. Each run has a damper for balancing and because we like to do workmanlike jobs, all pipes were painted to match the furnace and blower casing. Since there was no object in expensive appearance a round cased furnace was used with a coupled blower. The complete installation, while not "living room model" is clean, bright and workmanlike in appearance.

"The heat loss of the house was calculated at 170,000 Btu. The furnace-blower system has a rating of 179,800 Btu somewhat over requirements. A Klomp Air System unit manufactured by International Heater Co. was installed.

### Continuous Fan, Modulated Flame

"We feel that one of the interesting features of this installation is the fact that the blower runs all the time. We thereby supply uninterrupted ventilation. The oil burner (McIlvaine) also supplies heat all the time, the flame graduating from very low to high according to the demands of the house using five intermediate flames, each flame being controlled by the outside temperature (thermostat). We believe that this continuous operation will prevent any possible heat lag due to accumulated cold air in long runs, will give quick response to the demands of the house, and will maintain temperatures throughout the rooms. There should be practically no temperature stratification.

"So far this season the house has heated more economically than anticipated which we feel is due to the constant heat supply and the proper placement of the unit."

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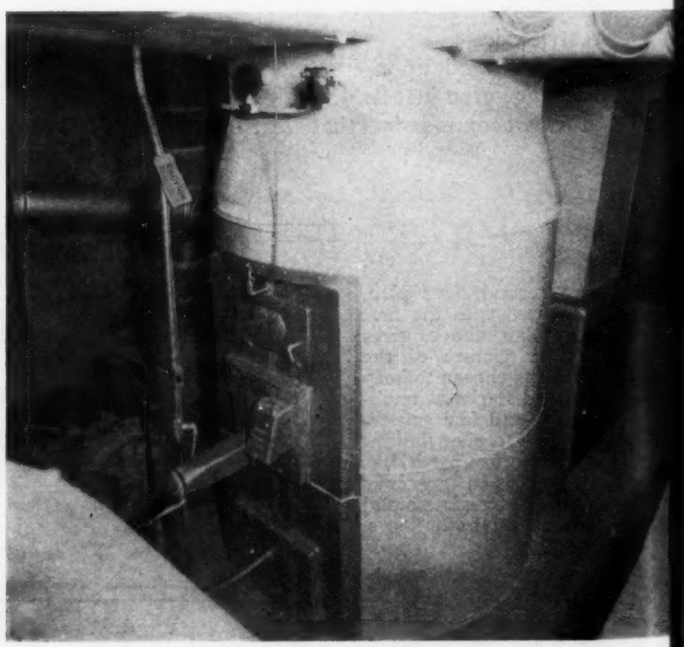
**Right—The Klomp Air System (International Heater Co. manufacture) with the round casing and attached blower was chosen because the basement is used for the furnace only. The furnace had to be pitted three feet to get head room.**



AMERICAN ARTISAN

# SHEET METAL SECTION

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# AMERICAN ARTISAN'S ANNUAL DIRECTORY *and* SHOW NUMBER

**The January 1940 issue of AMERICAN ARTISAN will, as usual, contain the *original, complete* Directory of the field inaugurated nine years ago. In addition, it will contain the Show section of the International Heating and Ventilating Exposition at Cleveland, complete with all listings and directions of what is to be displayed at the Show and where to find it.**

**The Directory will serve throughout the year as a reliable guide for dealers and contractors looking for sources of supply for all types of equipment used in the field. For manufacturers, it will offer an unparalleled opportunity to reach the men who "count" in the field. Those who specify and buy various types of equipment . . . and all at *no additional cost!* Regular space rates apply!**

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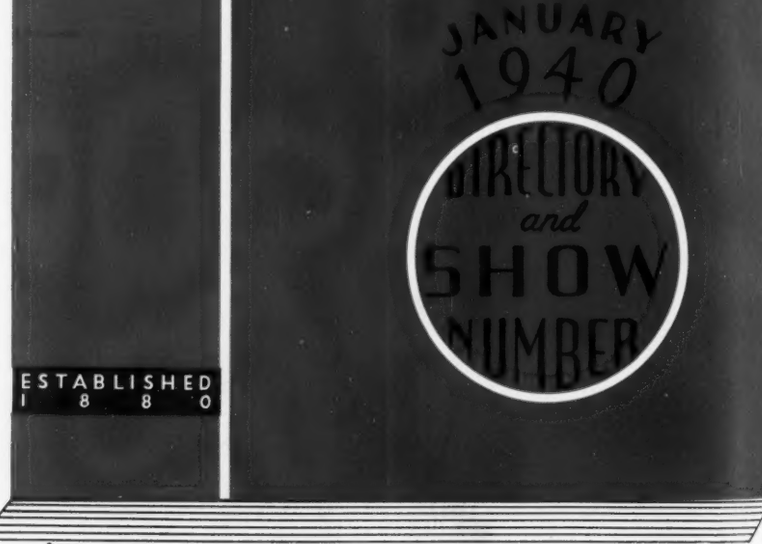


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# Resistance Welding of Copper Alloys*

## [ Part 2. Part 1 appeared in the September issue ]

By Ira T. Hook†

### Cold Work and Welded Strength

WITH the single exception of beryllium copper, the strength and hardness of the copper alloys given in Table 1 can only be increased by cold work—in the case of sheet metal by cold rolling. For the most part, these cold rolled metals begin to soften at 300° C. (572° F). Hence, any joining process where a spreading heat is used will soften the metal and the connection will be no stronger than that of the annealed sheet. Soft solder by reason of the low temperature of its application is the only exception.

In the case of resistance seam and spot welding, however, where the heat can be sharply localized and the welding operation accomplished in extremely brief periods, a measure of the cold work strength can be retained, even though the weld itself reaches the 2000° F. temperature necessary for proper fusion.

In Table 2 we have listed the strengths developed by resistance welded connections in soft and cold rolled copper alloy sheets. These values are to be regarded as minimum rather than maximum, since many of the welds were made on machines having insufficient capacity and inadequate time control.

The values given in the second of the tensile strength columns were obtained on test specimens cut from the welded sheet as illustrated in Fig. 4. Thus the weld itself is in shear. With a weld of adequate shearing area, the weakest section is at the edge of the weld where the direct tension is combined with a certain amount of bending stress. The latter stress is not great when the sheets are relatively thin.

It will be noted in the case of Everdur A, Ambrac and supernickel where we have tests on both the annealed and cold rolled materials, that an appreciable amount of the cold work strength is retained in the welded connection. It is possible to do this as the weld made, of a series of spots, is vignetted into the base metal. A still higher per cent of the cold work strength could, of course, be retained if additional seams were run with a

*Reprinted by permission of the American Welding Society from American Welding Society Journal, October, 1935.

†Research Engineer, The American Brass Co., Waterbury, Conn.

Photographs by courtesy of American Brass Co.

**Table 2—Tests of Resistance Welds in Copper Alloys**

| Alloy | Condition | Thickness Inch | Tensile Strength PSI Original Sheet | Tensile Strength PSI Weld in Gage Length | Efficiency of Weld % |
|---|---|---|---|---|---|
| Everdur A | Annealed | 0.064 | 57450 | 56180 | 97.8 |
| Everdur A | Annealed | 0.040 | 56550 | 57400 | 100 |
| Everdur A | Annealed | 0.020 | 63550 | 61030 | 96 |
| Everdur A | Cold Rolled | 0.064 | 94850 | 67470 | 71 |
| Everdur A | Cold Rolled | 0.040 | 103000 | 73500 | 71 |
| Everdur A | Cold Rolled | 0.020 | 85500 | 63050 | 74 |
| Everdur 1040 | Annealed | 0.040 | 65000 | 64350 | 99 |
| Everdur 1027 | Annealed | 0.040 | 61150 | 59130 | 97 |
| Supernickel | Annealed | 0.010 | 57850 | 58900 | 100 |
| Supernickel | Cold Rolled | 0.040 | 83000 | 73990 | 89 |
| Supernickel | Annealed | 0.010 to 0.040 | 57850 | 58500 | 100 |
| Ambrac A | Cold Rolled | 0.067 | 76970 | 59300 | 77 |
| Ambrac A | Cold Rolled | 0.041 | 77500 | 64350 | 83 |
| Ambrac A | Cold Rolled | 0.020 | 77500 | 64000 | 83 |
| Nickel Silver A | Annealed | 0.052 | 60600 | 60450 | 100 |
| 5% Al Bz | Annealed | 0.035 | 63330 | 60860 | 94 |
| 80:20 Low Brass | Annealed | 0.050 | 43650 | 43825 | 100 |
| 2:1 Brass | Annealed | 0.040 | 48000 | 47550 | 99 |
| 60:40 Brass | Annealed | 0.050 | 61900 | 50960 | 82 |
| Beryllium Copper | Cold Rolled | 0.015 | 119680 | 85570 | 72 |
| Beryllium Copper | Cold Rolled | 0.036 | 118430 | 61800 | 52 |
| Beryllium Copper | Heat treated after welding | 0.015 | 183750 | 130130 | 71 |
| Beryllium Copper | Heat treated after welding | 0.036 | 190950 | 77530 | 41 |

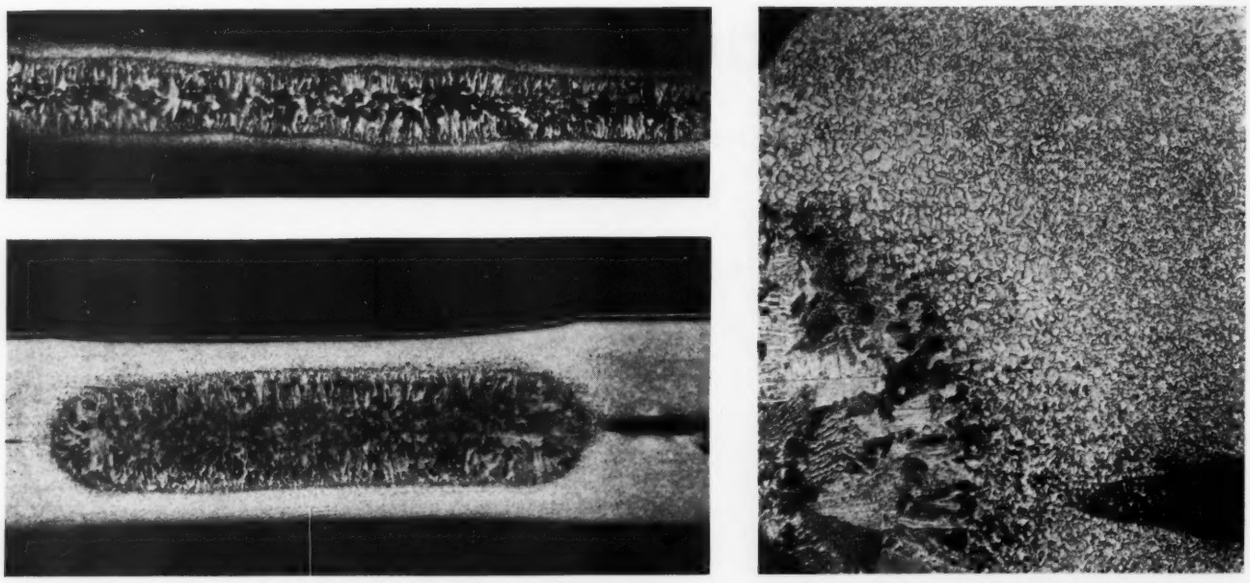


**Fig. 3—Everdur "A." 0.040-in. thick resistance seam welded. (Left) Transverse section of weld. (Right) Large magnification of edge of weld showing coarse grained weld metal merging into parent metal. (Top Left) Longitudinal section of weld. Unfused outside surfaces of original sheets on top and bottom with continuous weld between. (The dark patches are a different phase of the weld metal and not voids.) Same as welds in Figs. 1 and 2.**

wider pitch of spots (thus leaving cold worked metal between them) as in a riveted connection.

As will be seen from Figs. 3 and 5, the entire thickness of the sheet is not recrystallized and, therefore, not annealed by the welding heat. Further, the failure in tension is at the edge of the weld (end of the transverse section, Figs. 3 and 5) where a considerable part of the fracture must occur in the original cold worked material. Hence an appreciable part of the cold rolled strength is retained in the welded seam.

We believe it is possible to retain a still higher proportion of the cold work strength if the welding variables are pointed to this end. For instance, if the welding time were shortened, it should be possible to make the depth of the weld a smaller proportion of the thickness of the sheet without diminishing its width. With thyratron control, it is possible to cut the time to one wave of a 60-cycle current or $\frac{1}{120}$ second, provided the transformer has sufficient capacity to supply the requisite heat energy.

Another variable that can be controlled is the contact resistance of sheet to sheet and sheets to electrodes. If the former is made high and the latter low, the necessary heat intensity will be reached on the inner or welding surfaces while the outer surfaces are kept cool by contact with the copper electrodes. Thus, if the inner surfaces are given a thin coating of nickel or tin while the outer surfaces are left bare, the higher resistance of the coated surfaces should serve to localize the heat where it is wanted. Perhaps some coating other than that of these two metals will give still better results.

The third variable which is readily controlled is the pressure. In this case, we cannot go to extremes. There is an optimum which we must find by actual trial. If the pressure is too heavy, too much current is required, the metal is indented too much, the electrodes are squashed out too much and the weld metal is likely to be squirted in thin slivers between the sheets. If it is too light, too much heat is developed at the electrode contact and variations in pressure due to weight of sheet, buckles in sheet and inequalities in sheet surface bear too great a proportion to the total pressure. The pressure found most suitable for the copper alloys in thicknesses from 0.010 to 0.065 varies from 200 to 500 pounds. It is only about half as great as that most frequently used for steel.

In the case of continuous seam welding, the number of welds per inch of seam also has an optimum value. Thus, if the spots are too far apart, the narrow part of the seam midway between spots may become too narrow or be left unwelded. Ten welds per inch is near the low limit for a good weld. On the other hand if there are too many welds per inch, the metal and the rollers are hot-worked too much and the current values are excessive due to the detouring of a considerable part of the current through the finished weld. We have found that, in most cases, there should be not more than 19 or 20 welds per inch with 16 somewhere near an optimum for medium thickness sheets.

## Applications of Resistance Welding

In addition to the applications pointed out in the opening paragraphs, resistance welding offers an excellent means of making connections in copper alloys for a great variety of purposes.

Thus, the cold rolled strength and corrosion-resistance of the copper alloys can be advantageously utilized in *light weight construction* making engineering shapes such as beams, box girders, columns, struts and trusses from thin sheet metal strip

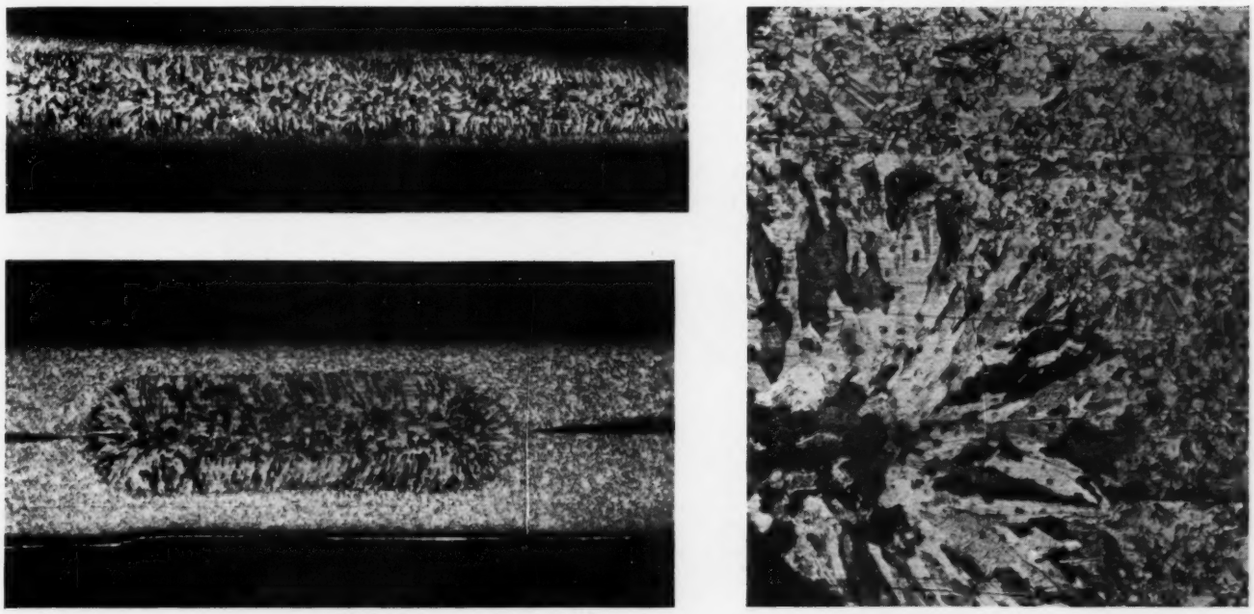


**Fig. 5—Resistance weld in 0.040-in. thick Everdur No. 1027 sheet. (Lower left) Transverse section. (Right) Extreme edge of transverse section in higher magnification. (Left Above) Longitudinal section.**

drawn into simple angles, channels, etc., welded together. Many times such structures are economical by reason of their light weight and long trouble-free service.

Where a corrosion-resisting screen or grid is desired as in water works or sewage disposal works, the manufacture of well screens and floors for slow sand filter beds, keystone-shaped, rectangular or round wires can be resistance welded to the cross ribs making a very economical and rigid method of connection with no loss of metal or expense for fastenings. Reënforcing grids where a high-strength, corrosion-resisting alloy is desired, as for instance in concrete mats for river revetments, highway slabs through swampy places, tunnel lining, etc., can be made by spot welding the cross-bars at each contact.

Containers of various sorts can be resistance seam welded. Range boilers, barrels, drums and cylinders can be rolled up from a cold rolled or light annealed sheet of Everdur (or nickel alloy if the corrosive condition warrants it) and the longitudinal seam resistance welded. If the sheets are sufficiently thin, the heads can also be placed flange outwardly and resistance seam welded.

Architectural designers can take advantage of the structural, time-defying and aesthetic qualities of these alloys to make assemblies for doors, window frames and sash, spandrels and side panels by means of resistance welds.


### Acknowledgment

The writer acknowledges with thanks the many courtesies of the Thomson-Gibb Electric Welding Company in the making of experimental welds and of The American Brass Company for permission to publish the results.


# Interest Being Shown in New Sheet Metal A'ssn

FROM the office of the secretary (H. C. Bitter, New Secor Hotel, Toledo, Ohio) comes information that a very encouraging number of letters have been received from contractors and organizations expressing interest in the proposed new association of sheet metal contractors. Mr. Bitter reports that these communications have come from many parts of the country and have asked for additional information. This information has been supplied and the officers welcome all such letters.

As pointed out in the report of the organization meeting held September 16 in Milwaukee, the new association proposes a comprehensive and ambitious program designed to cover the needs of this broad industry today and for many years in the future. All the suggestions offered at the Milwaukee meeting and in the letters received are and will be given careful consideration. A follow-up meeting will be held on November 26 in Cleveland or Toledo. So that this November 26 meeting will have definite suggestions to work on, the officers ask every interested contractor or association to send, at once, their suggestions for the program and the organization.

The first annual convention of the new association will be held in Cleveland, at the Hotel Carter, January 25, 1940. This date and this convention city were selected in order that contractors attending the Air Conditioning Exposition of the American Society of Heating and Ventilating Engineers which opens January 22 and the winter meeting of the National Warm Air Heating and Air Conditioning Association held the same time, in Cleveland, will be able to combine all three meetings in one trip.

**Stamping dies for this top would have cost several thousand dollars. Ingenuity produced a flawless top, without the use of dies, by everyday shop fabricating methods and equipment.**

# Intricate Stainless Steel Top Produced Without Dies

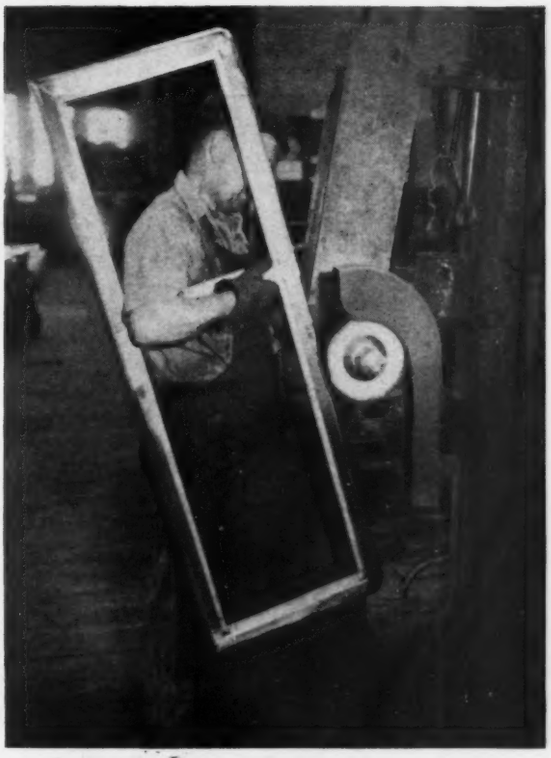
HOW the well equipped sheet metal shop, with power machinery, good workmen and ingenuity—but above all ingenuity of management and workmen—can produce at reduced cost sheet metal products comparing equally with die stamped products, is splendidly indicated in the photographs taken in the shop of the Riester & Thesmacher Co., Cleveland, Ohio, showing steps in the production of a floor cabinet.

The product pictured is a beverage dispensing and cooling cabinet. The exterior is Armco "Paintgrip" steel, spray painted for a finish. The interior of the cooling compartment is 16-ounce copper. The inside and outside shells are separated by a heavy layer of wall board insulation.

The top of the cabinet is stainless steel and it was on the fabrication of this top with its lids, drains and working surfaces that the really interesting problems centered.

The corporation under whose name these cabinets are sold, wanted the cabinet to be a truly attractive unit. Since the top, with its gleaming surface is the most prominent part of the cabinet and is most often seen by the buyer of the cabinet,

**Left—The formed top (right side up) has had the gussets spot welded across the miters, been trued up in the plate type jig and is here having the mitered corners gas welded. Right—The central bar has been gas welded (top side down) and here has been turned over (top side up) while the operator touches up with solder the joint between bar and rim.**



After the rim has been welded the operator grinds the miter welds flush with adjacent metal on the power grinder (fine grit wheel) and after grinding buffs the rim for polish on the buffing wheel mounted on the other end of the shaft of the grinder. The finished rim defies detection.

it was felt that this top should be flawless. The design called for a smoothly rounded edge (see photograph of the completed cabinet) divided into two halves. One half of the top is a corrugated drainboard sunk below the level of the rim. The other half is the container with coils below, divided into two lids, the lids level with the rim.

### Dies Rejected Because of Cost

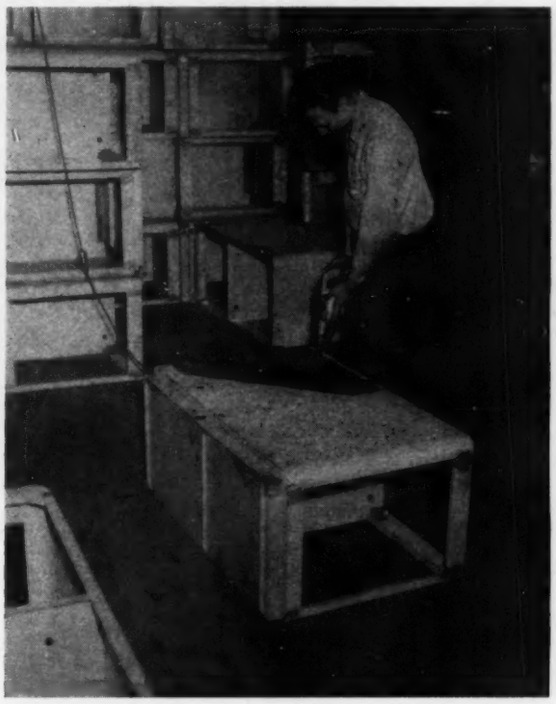
To obtain the flawless top desired, die stamping was first considered, but to produce tops as specified the die cost alone was quoted at several thousand dollars. Had the buyer been in the market for cabinets in ten thousand quantity lots, this die cost would probably have been justified and could have been absorbed into the large number of units without difficulty, but the buyer did not want 10,000 units in an order. He wanted two or three or five hundred units per order and several months might intervene between orders since this was a new item and had to be popularized. There seemed, then, little justification for the high die cost.

So the buyer came to Riester and Thesmacher with the problem. How might the cabinets be produced in relatively small quantities, without high die cost, but still flawless in appearance?

Riester and Thesmacher designers and management went to work on the problem. So far as the exterior cabinet and the interior liner were concerned, there was no problem—for these were simple sheet metal shop fabrication procedures. But the top required some ingenuity, backed up by good workmanship.

### How Top Was Fabricated Without Dies

As finally developed, the stainless steel top is an assembled unit. The rolled rim, with its smooth curve and ball corners, is made from 5-inch wide



Left—Operator drilling holes for hardware and trim using a template to spot holes. Further time is saved by using snap-on hardware. Right—The Riester and Thesmacher spray paint booth and paint room is one of the busy departments. Here almost any color, of any material, can be applied.

**Left—Panels of the cabinet are spot welded to the inside liners and sub-assemblies by this three-man crew. A certain routine has been worked so that no necessary "spot" is overlooked while the cabinet is turned a minimum number of times. The spot welder here saves hours of time. Right—Sub-assemblies waiting liners and tops.**

stainless steel strip. The strip is cut into lengths as long as the four sides of the top. Miters are then cut for the four corners and the cut and mitered strip is placed in an ordinary power press holding a plain round die of the curve of the rim. One press and the rim is rolled.

### Welding the Formed Rim

The rolled and mitered rim is then placed on a special plate jig and bent into the rectangle of the top — under side up. Small reinforcing gussets (straight lengths of scrap) are spot welded across the miter for additional stiffening. Then the joined rim is turned over, top side up, and trued up in the jig and the miters gas welded. The plate jig used, with an operator welding a corner, is shown in one of the pictures.

After the four mitered corners have been welded and while the rim is still in the jig which holds the rim true, the cross bar of the two-compartment cabinet is soldered in place (see photograph). The rim is then turned top side up and the joint between bar and rim touched up with solder to remove any small unfilled spaces. The same jig is used, but a second set of lugs on the plate hold the rim in true position.

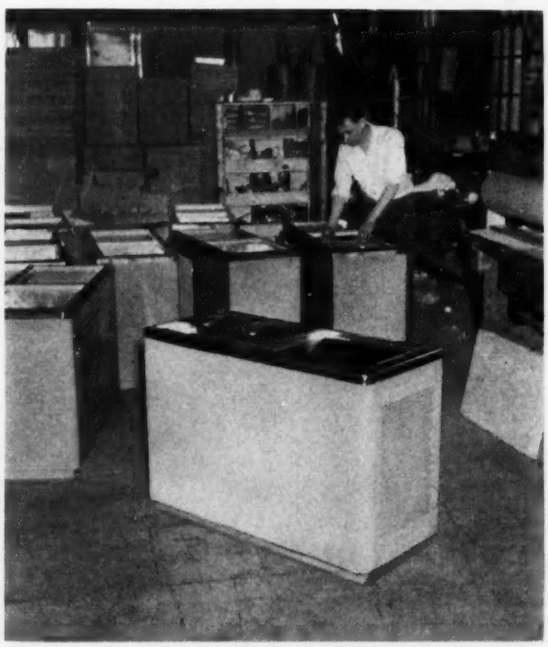
### Grinding and Polishing the Rim

The next step is to make the polished outside flawless. The formed and welded rim is first ground on a power grinder as shown in another picture and when the weld is brought to surface with the adjacent metal the rim is taken from the grinder and buffed for polish on another wheel on the same machine (see photograph). The finished rim defies detection and so far as appearance goes might be stamped from a single sheet.

### Forming the Drain Board

The drain board in one-half of the top (depressed) is corrugated in a small power press which holds a single die capable of making two ribs at each operation. Using suitable guides the washboard is moved along under the die until all corrugations are formed. The corners of the sheet are then cut, mitered, gas welded, ground and polished and another die comparable part is completed.

The double lid above the cooling compartment



**The final inspecting room where the cabinet is examined with critical eye for any flaw of assembly, welding, polishing, attachment of hardware, fit of all moving parts, imperfections in the painting. After passing inspection, the cooler is wrapped, crated and is ready for delivery.**

has an offset at the front to hold a drain tray which, in turn, holds a perforated splash pan. Drain holes are punched on a small power brake where a setup of punches perforates a full row of holes in one operation. Five operations completes the holes.

The shelf flat sheet is then mitered, the edges are turned up and lips turned out all around. The corners are gas welded; the welds are ground smooth and the part is placed in a simple box jig (see photograph) and an operator with a portable grinder and buffing wheels removes all traces of the weld.

### Forming the Lids

The two lids are insulated, since they close the cooling compartment. The under half of the lid is made of 22 gauge "Paintgrip." The stainless steel upper surface and the "Paintgrip" under surface are seamed over the insulation, all joints are soldered, outside surfaces, edges, corners are polished and the lid is complete.

By these everyday practices, plus ingenuity, plus good workmanship, a flawless top is produced without die cost, using equipment common to every good shop and without special machinery or setups which could easily disrupt a busy fabricator of dozens of products.

### Body Panels and Assembly

As stated earlier, the fabrication of the body presented few problems. The sub-assemblies are welded together and delivered as a complete unit to the spot welders. The panels for the outside, ready cut from templates, are brought to the frames and the panels are spot welded to the framework in a few, carefully worked out operations. One crew of three men (see photograph) easily handles all spot welding of panels to sub-assembly.

Meanwhile, the copper for the cooling compartment liner—tinned on one side—is cut from template and soldered into tanks as shown in another photograph. A special jig which can be revolved 360 degrees in every direction holds the tank for soldering after the pieces have been seamed on a long rail. This copper liner is used in the cooling half of the cabinet. Cooling coils are placed inside the copper tank after delivery.

The other half of the double cabinet (under the corrugated drain board) houses the compressor. The back and end is covered with flattened expanded metal in frames to permit ventilation of compressor.

### Paint Finish Applied by Spraying

As the photographs show, the finished cabinet is resplendent with a soft green color. This finish is obtained by spray painting the cabinet with a semi-luster enamel which is oven dried. Riester and Thesmacher, making numerous products which must be finished, have adopted spray painting and oven drying and can, on order, supply practically any desired color or finish.

### Hardware and Final Inspection

The last steps in completing these cabinets consist of attaching hardware and trim, inspecting for fit of parts, and crating. Holes for hardware and trim, as shown in one of the photographs, are drilled after the outside panels have been spot welded to the sub-assembly. Templates are used to locate the holes and attachment has been simplified by adoption of snap-on hardware and trim.

**Left—The perforated shelf pans have been mitered, edged, welded, holes punched and are here placed in a simple box jig which holds the tray while the operator uses a portable grinder and buffer to finish off the welds or other rough spots. Right—The copper liners are seamed on a long rail as the operator above is doing. Then the formed liner is fastened on the special jig (right) which revolves 360 deg, every direction while seams are soldered.**

# 40 Tons of Sheets ½ Mile of Ducts 30 Exhaust Systems 13 Ventilators 13 Fans— One Ventilating System

By R. C. Nason

THE new high school at Harrison, N. Y. is a striking example of the exhaust principle of ventilation that features large roof ventilators and electric propeller fans, with exhaust grilles in all rooms. Supply-air in this building enters through 34 recessed floor-installed "univents" that incorporate fans and heater sections, but are ductless.

The ventilating contractor on this interesting project is Frank J. Townsend of Mt. Vernon, N. Y. Practically one-half mile of duct work was required.

The ventilation arrangement, considered as a problem, is regarded as appropriate for this rambling type of structure. For the Harrison school is 300 ft. long on each of its two sides, is of two stories and has short wings on the ends of the legs of the right triangular general design. In a building of this sort numerous small and compact exhaust systems with the motive force furnished by roof ventilators and propeller fans, as opposed to centrifugal fans, are often highly satisfactory. Only the auditorium has a fan-driven air supply system.

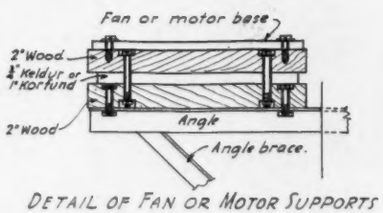
## Duct Fabrication

The air-exhaust arrangement, as a whole, is divided into about 30 different duct assemblies to make up, in turn, 30 separate exhaust systems that cover all rooms. Among school rooms reached by contractor Townsend's network of ducts and grilles and not always observed in such installations might be cited shower rooms—girls' and boys'—and locker rooms—total of four with 8 grilles per room.

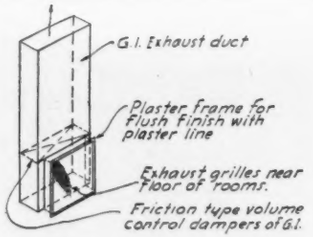
To be able to make and install 40 tons of ventilation ducts requires modern equipment both in the sheet metal shop and on location. This Mr. Townsend has and it was all used. For instance, all straight duct section seams were made up on his Pittsburgh lock forming machine. Sides, tops and

◆

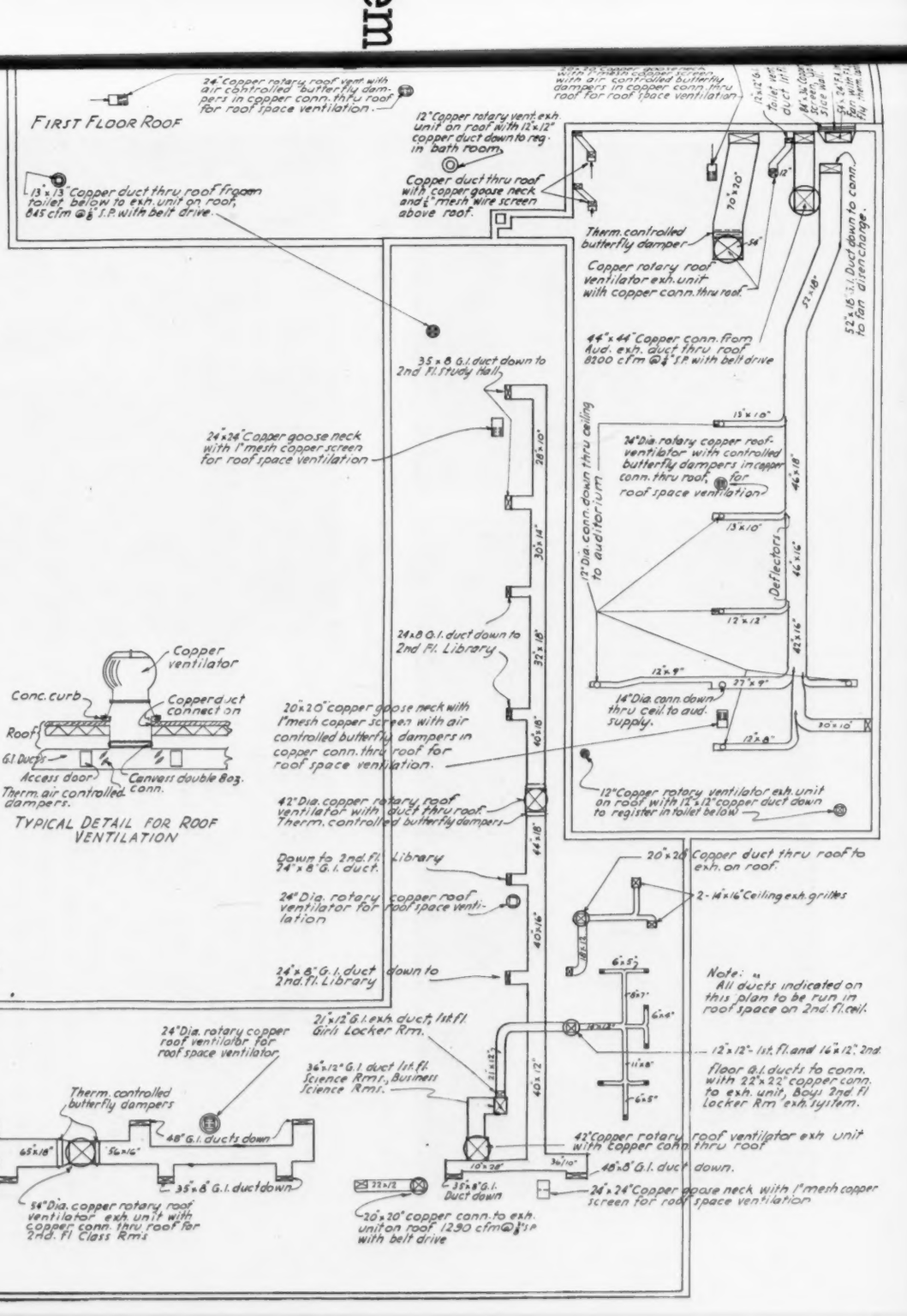
**Top, Auditorium supply and exhaust ducts with reinforcing rods for false ceiling in place. Bottom—4 by 2-foot exhaust duct with offset to avoid soil line. Note angle iron stiffeners (4-foot centers) and cross braking.**

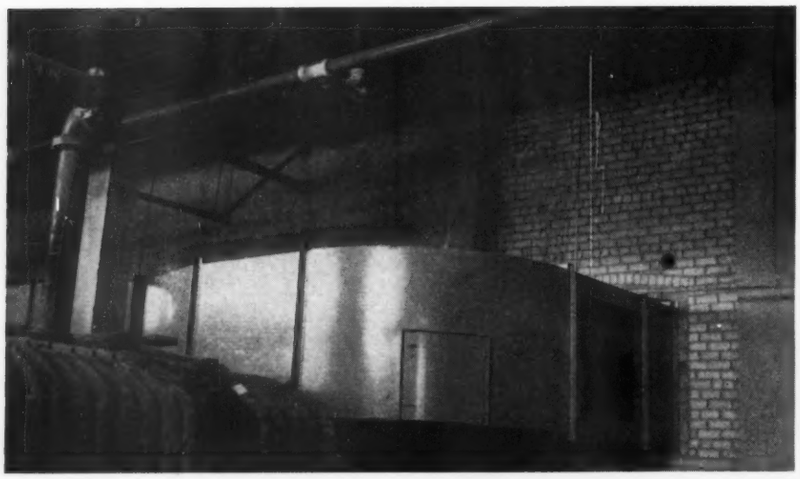



DETAIL OF FAN OR MOTOR SUPPORTS


G.I. Exhaust duct
Plaster frame for Flush Finish with plaster line
Exhaust grilles near floor of rooms.
Friction type volume control dampers of G.I.

DETAIL OF VOLUME REGULATING DAMPER AT CLASS ROOM GRILLES ALSO TYPICAL FOR OTHER GRILLES AS CEILING TYPES IN TOILETS, LOCKER ROOMS.


FIRST FLOOR ROOF
24"Copper rotary roof vent with air controlled butterfly dampers in copper conn. thru roof for roof space ventilation.
12"Copper rotary vent. exh. unit on roof with 12"x12" copper duct down to reg. in bath room.
13"x13" Copper duct thru roof from toilet below to exh. unit on roof, 845 cfm @ 1/8" S.P. with belt drive.
Copper duct thru roof with copper goose neck and 1/2" mesh wire screen above roof.
Therm. controlled butterfly damper
Copper rotary roof ventilator exh. unit with copper conn. thru roof.
44"x44" Copper conn. from Aud. exh. duct thru roof 8200 cfm @ 1/4" S.P. with belt drive
35"x8" G.I. duct down to 2nd Fl. Study Hall
24"x24" Copper goose neck with 1" mesh copper screen for roof space ventilation
12" Dia. conn. down thru ceiling to auditorium
24" Dia. rotary copper roof ventilator with controlled butterfly dampers in copper conn. thru roof for roof space ventilation
Deflectors
14" Dia. conn. down thru ceil. to aud. supply.
12"Copper rotary ventilator exh. unit on roof with 12"x12" copper duct down to register in toilet below
24"x8" G.I. duct down to 2nd Fl. Library
20"x20" copper goose neck with 1" mesh copper screen with air controlled butterfly dampers in copper conn. thru roof for roof space ventilation.
42" Dia. copper rotary roof ventilator with duct thru roof Therm. controlled butterfly dampers
Down to 2nd. Fl. Library 24"x8" G.I. duct.
24" Dia. rotary copper roof ventilator for roof space ventilation
24"x8" G.I. duct down to 2nd. Fl. Library
20"x20" Copper duct thru roof to exh. on roof.
2-14"x16" Ceiling exh. grilles
Note: All ducts indicated on this plan to be run in roof space on 2nd. fl. ceil.
12"x12" - 1st. fl. and 14"x12" 2nd. floor G.I. ducts to conn. with 22"x22" copper conn. to exh. unit, Boys 2nd. Fl Locker Rm exh. system.
21"x12" G.I. exh. duct, 1st. fl. Girls Locker Rm.
36"x12" G.I. duct 1st. fl. Science Rms., Business Science Rms.
42" Copper rotary roof ventilator exh unit with copper conn. thru roof
48"x8" G.I. duct down.
24"x24" Copper goose neck with 1" mesh copper screen for roof space ventilation
35"x8" G.I. Duct down
20"x20" copper conn. to exh. unit on roof 1290 cfm @ 1/8" S.P. with belt drive
ROOF 1ST FLOOR
22"x22" Copper duct thru roof from locker room below to exh. unit or roof, 2560 cfm @ 3/8" S.P. with belt drive.
24"x24" Copper exh. duct from ceil. grille below thru roof to exh. unit on roof.
24"x12" & 28"x14" G.I. ducts down to 1st. fl. Equip. Storage and Toilet Rms.
Therm. controlled butterfly dampers.
24" Dia. copper rotary roof ventilator exh. unit with copper conn. thru roof
24"x24" Copper goose neck with 1" mesh copper screen with air controlled butterfly dampers in copper conn. thru roof for roof space ventilation
24" Dia. rotary copper roof ventilator with air controlled butterfly dampers in copper conn. thru roof for roof space ventilation
45"x16" G.I. Duct down
2-14"x14" ceil. exh. grilles
8"x12" vent 1st. Fl.
12"x12"
12"x8"
12"x6"
6"x4"
6"x4
6"x5
6"x6
36" Dia copper rotary roof ventilator exh. unit with copper conn. thru roof, 1st. Fl. Class Rooms
Therm. controlled butterfly damper
45"x30" copper goose neck turned over roof with copper wire screen intake down to gym. supply unit.
24"x24" Copper exh. duct from ceil. grille below thru roof to exh. unit on roof 3240 cfm @ 1/8" S.P.
ROOF 1ST. FLOOR
20"x30" copper duct thru roof from Locker Rm. to exh. unit on roof
Exhaust roof fan
False apron
Copper duct conn.
2"x4" Wood sill
Conc. curb
Roof
Self acting louvres
Canvass double Bag. Conn.
G.I. Ducts
Access doors
Therm. air controlled dampers
TYPICAL DETAIL FOR EXHAUST ROOF FANS
Copper ventilator
Conc. curb
Copper duct connection
Roof
G.I. Ducts
Access door
Canvass double Bag. Conn.
Therm. air controlled dampers.
TYPICAL DETAIL FOR ROOF VENTILATION
20"x20" Copper duct thru roof from Locker Rm. below to exh. unit on roof. 2nd. Floor toilet 1466 cfm @ 1/8" S.P. with belt drive.
21"x12" - 1st. floor & 13"x12" - 2nd. floor G.I. ducts to conn. with 22"x22" copper conn. to exh. unit on roof. 2nd. Fl. Girls Locker Rm. plus 1st. fl. Boy's Locker Rm
24"x24" Copper goose neck with 1" mesh copper screen for roof space ventilation
24" Dia. rotary copper roof ventilator for roof space ventilator
48"x8" G.I. ducts down
Therm. controlled butterfly dampers
30"x10"
40"x14
48"x8" G.I. ducts down
65"x18"
56"x16"
35"x8" G.I. duct down
54" Dia. copper rotary roof ventilator exh. unit with copper conn. thru roof for 2nd. Fl Class Rms
24"x24" Copper goose neck with 1" mesh copper screen for roof space ventilation



**Above, left—Four by four-foot, 12-gauge breeching, 50 feet long. Above, right—Copper exhaust cap over propeller fan on 10-gauge curb (see roof plan).**

bottom pieces were shipped to location as panels, seams made up but not closed in the shop. Only short sections were trucked ready to erect. Contractor Townsend believes that the flat panel method of preparation, as indicated, allows easier transportation than making up large, long, complete duct sections and trucking them as such.

Curved and short sections (those shorter than 4 ft.), were fully assembled in the shop as complete sections, seams were turned by machine and closed by one of the contractor's compressed-air hammers. Another compressor and air hammer were maintained at the school during erection and was used for closing Pittsburgh seams on location. Another use of the compressor was making holes in concrete for the reception of ¼-in. "Tampin" plugs at several points where such plugs were required for fastening the strap hangers for ducts.

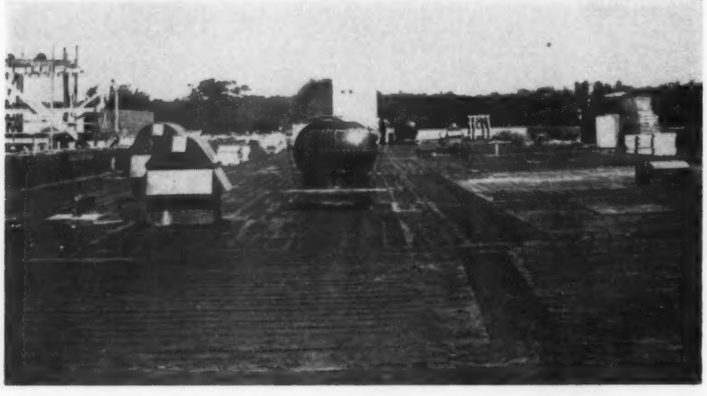
### Duct Supports

In most of the building steel reinforcing rods of the concrete ceilings were available as ties for strap hangers for ducts. At other ceiling points 2-in. planking permitted ready insertion of hanger screws, while in still other points hangers had to be attached to concrete beams. "Tampin" plugs had to be used at such points and have been found by this contractor to provide satisfactory support. In general, hanger straps were carried down duct sides at intervals of 8 ft., screwed to the sheet metal at two points, namely near the top and near the bottom, while the lower ends of hangers were turned under 1-in. and again screwed to duct bottoms.

Duct sections, maximum lengths being 8 ft., were readily handled by two mechanics, in charge of foreman Frederick Crozier. Two-man teams worked from platform scaffolding placed on portable horses. Duct section ends were flat lock seamed with angle iron stiffeners on all four sides. These angles were placed every 4 feet. In addition, most panels were cross broken for additional stiffness. Practically all sheet metal is furred behind extruded lath plus light steel reinforcing rods.

Risers, of which the sheet metal contractor installed several dozen, are set into wall chases left by masons. Then a light steel gridwork of reinforcing rods was wired to the clay tiles of the walls and across the risers.

Sheet metal ducts over shower rooms in the Harrison school, following good practice for installations in damp spots that are to be furred in, were



**Left—Roof view showing two hooded propeller fans (each on a separate exhaust system) and several rotary ventilators (see roof plan). Right—Contractor Townsend has an efficient shop, fully equipped with Pittsburgh lock forming machine and power equipment capable of handling the largest ventilating contracts.**

made of 16-oz. copper with soldered seams. Lateral mains for exhaust of steam incident to shower bathing were placed in the ceiling at about the centers of shower rooms and ceiling grilles permitted the escape of steam, aided by two large Davidson vertical-shaft electric propeller fans with copper blades on the roof. There are two such shower rooms (one boys', one girls'), the rooms being adjacent to the gymnasium.

### 12-Gauge Smoke Breeching

An important item of this contract was the 12-gauge steel smoke breeching Mr. Townsend fabricated and installed to handle oil-burner exhaust gases from three boilers. This is 50 ft. long, graduated from 3 ft. x 3 ft., at the most remote boiler, to 4 ft. x 4 ft., at the boiler nearest the stack. It was made up in 4-ft. sections, section ends braced

**Ducts over 4 feet long in section were shipped to the job as a bottom, a top and two sides. Pittsburgh locks were shop formed on the sides—top and bottom edged for the lock. A pneumatic hammer was used to close the locks on the job. Text explains the procedure.**

with heavy angle iron, welded on, then sections were bolted together with gaskets between. A handhole was provided for cleaning and a larger opening provided for installation of a counterbalanced draft damper by another contractor.

More than a dozen 2-ft. x 2-ft. copper goosenecks were fabricated and connected by the sheet metal contractor for relief of heat from the "false roof." This is regarded as good insurance, although temperatures between the roofs should not be high because 2-in. Celotex roof insulation was laid by another sheet metal and roofing contractor, the Hillcrest Roofing Co., of Mt. Vernon, who did the outside sheet metal work such as gutters, leaders, flashing and miscellaneous sheet metal work other than roofing.

### Auditorium Supply System

Still another feature of the ventilation contract is the auditorium forced-air supply system. Outside air is passed through primary and secondary heaters under automatic control and delivered to the ceiling of the auditorium through concentric-ring ceiling diffusers. (Anemostats.) Seven such diffusers were placed in the main ceiling, two in the ceiling represented by the floor of the balcony, that is, under the balcony. Collectively the 9 diffusers handle 9,000 cubic feet of air per minute. The main supply duct here was 52-in. x 18-in. Exhaust for this room is handled by several grilles in the front of the stage, then passed through an exhaust fan and partially recirculated to the fresh air supply to this room. The exhaust main here is 48 in. x 24 in. and picks up from four openings in the front of the stage.

The ventilating contractor also made and installed a total of 42 roof curbs of 10-gauge steel, for the most part square in shape and electrically welded in the shop. Curbs varied in size from 18 in. to 60 in. on a side and were uniformly 2 ft. high. The 13 propeller fans, an equal number of rotary ventilators and 16 goosenecks were connected to these curbs, while exhaust ducts join curb bases. At points on the roof where curbs were exposed the Hillcrest Roofing Co. copper flashed from fan and ventilator bases to his roofing.

Gauges of galvanized sheet steel for ducts ranged from 18 to 24, copper was mostly 16-oz. Some 40 tons of steel were required for ducts alone. Mr. Townsend provided unusually good locker room ventilation by extending branch ducts in walls taken from overhead mains and terminating about 2 ft. above locker tops and in sidewalls. There are four such rooms and each has 8 exhaust outlet grilles. The total cost of the building when completed will be $500,000.

## Air Conditioning In a Clinic

(*Continued from page 33*)

practically all alike except for small variations in width, we had no difficulty fabricating.

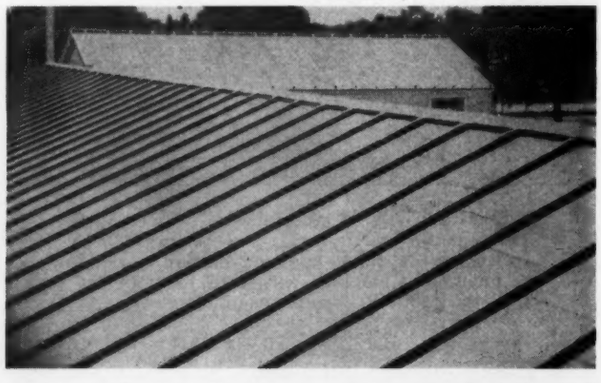
There are, as the plans show, a great many takeoff sections where branches leave mains. These are all air-flow, low resistance fittings and because there are so many and all are about alike except for width, we worked out a plan for fabricating short main sections carrying the branch takeoff and a short length of branch pipe. These were all identified for location and were ready for erection when received. By connecting to these takeoff sections the continuing main and the run of branch, we simplified our erection work considerably. Plenums and housings were handled as separate units with each section made up and marked for connection and this part of the work was advanced through the shop and in the building as a unit.

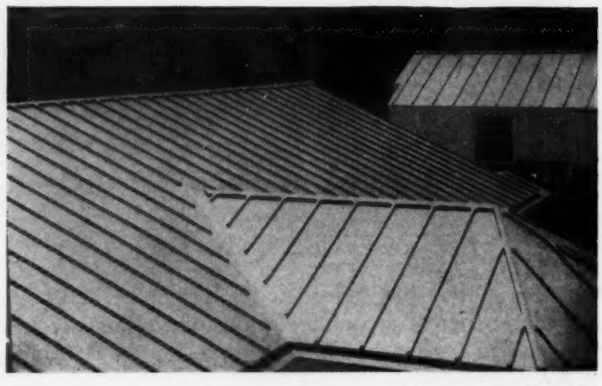
# A Batten-Type Copper Roof

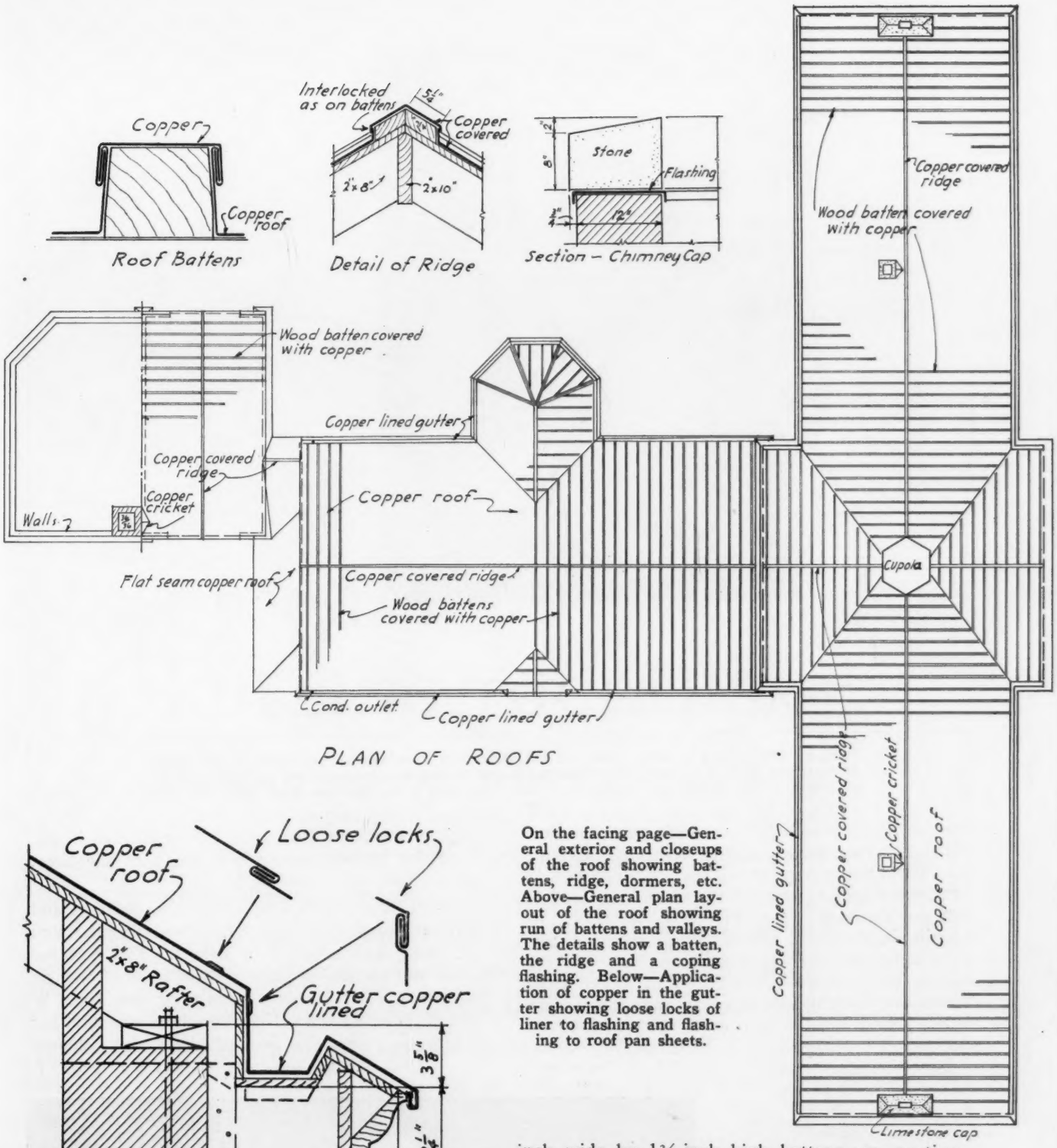
THE Henry C. Smither Roofing Co., Indianapolis, Indiana, recently completed the application of more than ten and one-half tons of 16-ounce, soft copper as a roof for the woman's dormitory, Hanover College, Hanover, Ind. The batten type roof is thought to be an outstanding example of the sheet metal man's claim that a pronounced batten adds very definitely to the architectural appearance of the building.

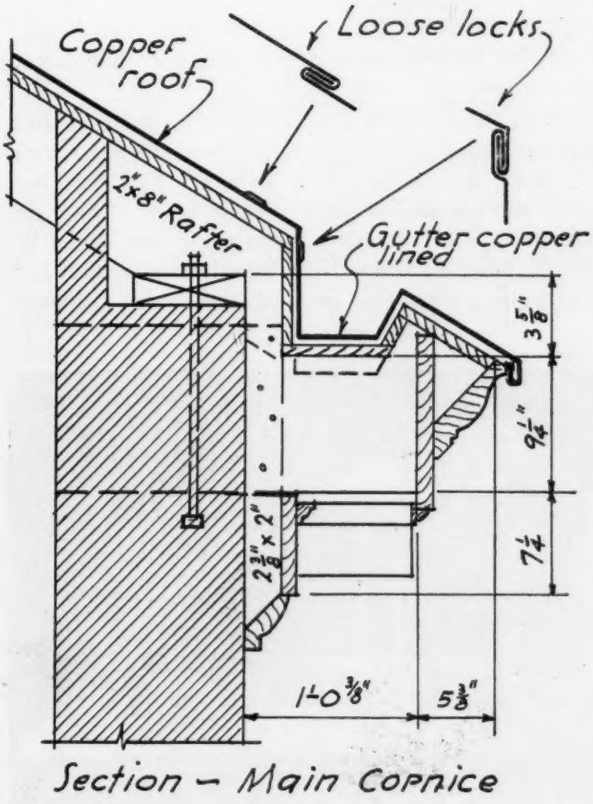
As the roof plan and the photographs show, the building has a main front wing centering on a short entrance L, behind which is a long rear wing and attached service building. The meeting point of the two axes is a copper covered cupola of intricate contour topped, in turn, by an interesting weathervane designed and made in the Smither shop.

From the cupola as a center point the main ridges run three ways; the short, fourth ridge goes to the front. As the photographs show clearly, the ridge is a heavy (10½ inch wide) member, meeting at a sharp peak. From the ridge to the gutter the 1⅞-







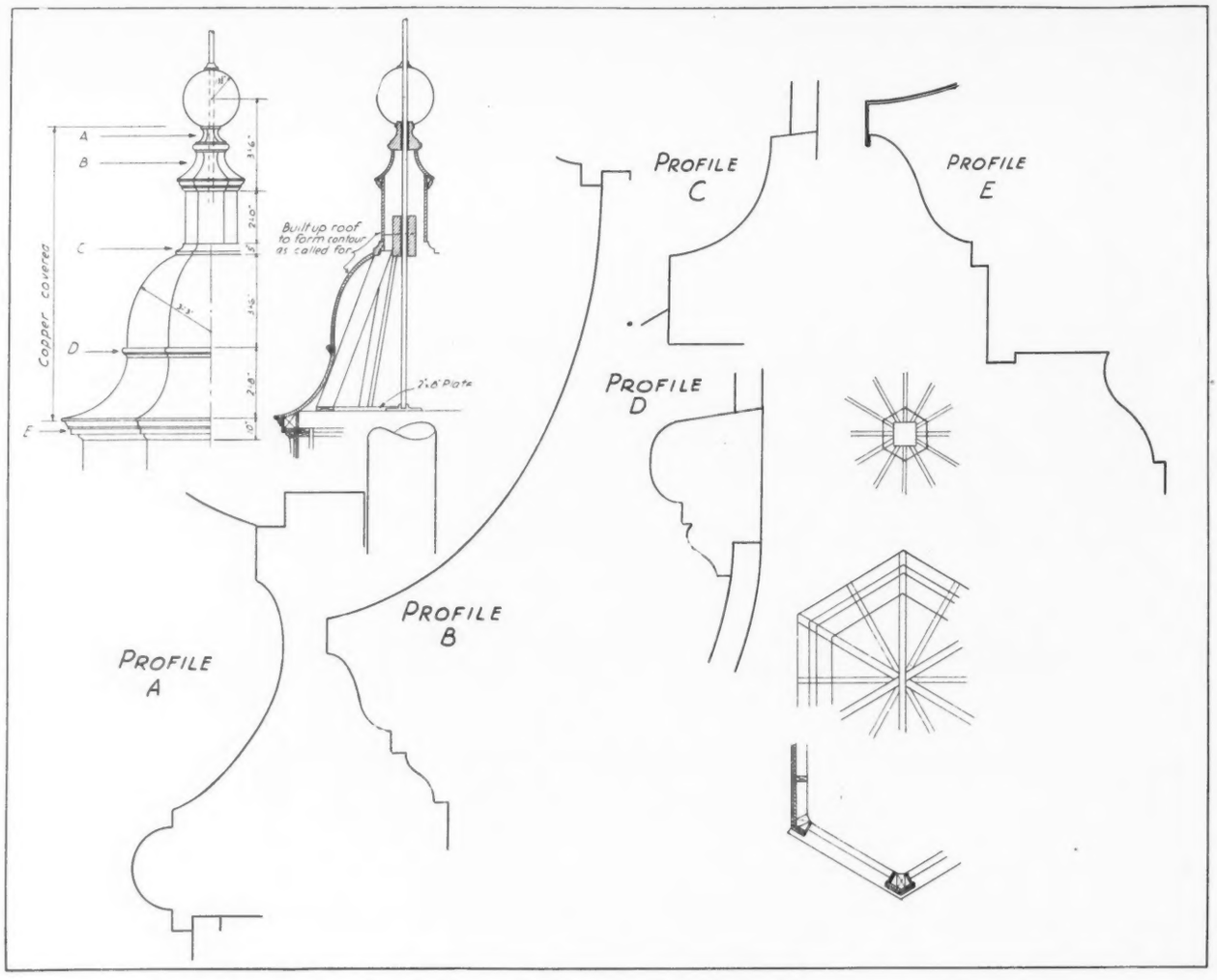




**On the facing page—General exterior and closeups of the roof showing battens, ridge, dormers, etc. Above—General plan layout of the roof showing run of battens and valleys. The details show a batten, the ridge and a coping flashing. Below—Application of copper in the gutter showing loose locks of liner to flashing and flashing to roof pan sheets.**

inch wide by 1¼-inch high battens run continuously. These battens are slightly narrower at the top than at the bottom and have a flat top. The wide and flat batten cap tends to accentuate the pronounced lines of ridges and battens.

The four valleys radiating from the cupola and the two small dormers in the back wing are the only breaks in the long stretches of roofs. This design simplified greatly the fabrication and laying of the copper sheets.

All sheet metal pieces were cut and formed in the Smither shop in Indianapolis and trucked to Hanover. The pan sheets were made in 8-foot



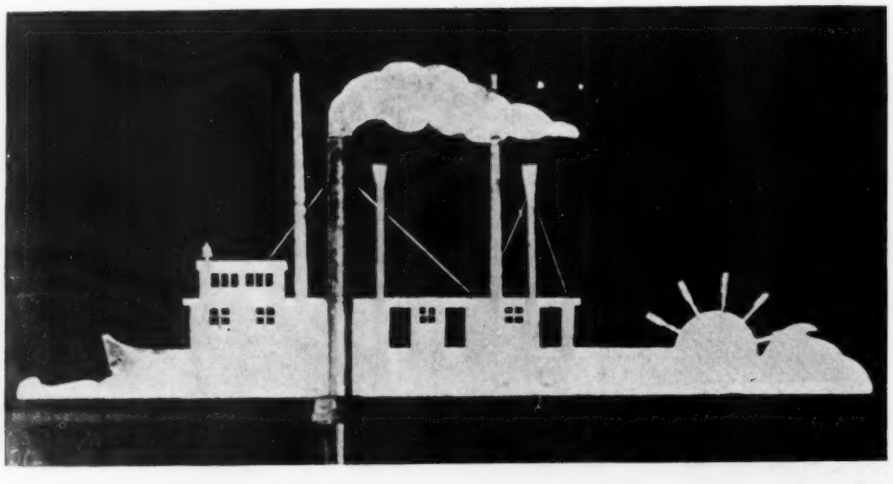

**Reduced details (not in scale) from the full scale shop drawings for segments of the cupola. The profiles show true contours of the pieces and true cross sections of the moldings. Below —Closeup of the cupola and the weather vane fabricated in the Smither shop from the architect's model.**

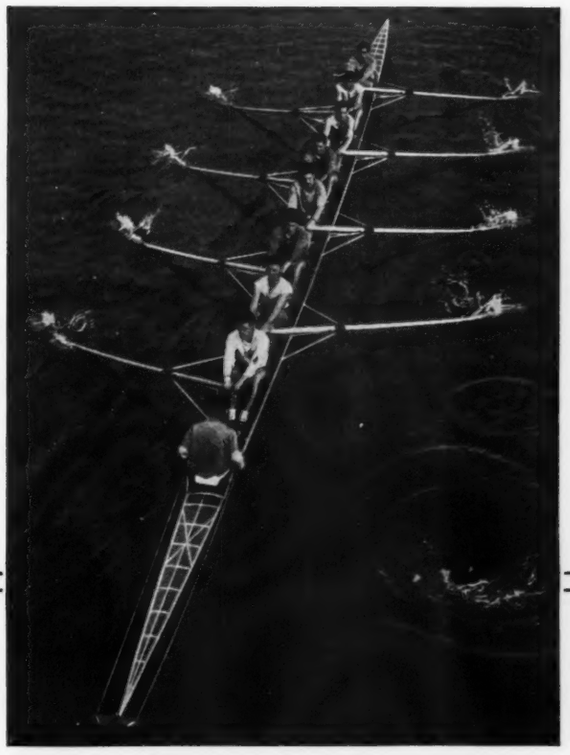
lengths, 22¼ inches wide in the pan with an additional 2 inches turned up on each edge for the batten and batten cap. Since the roofs measure 18 feet from ridge to gutter on the front wings and 21 feet on the rear wing there was always short lengths in the third sheet. These short lengths were alternated—at the top in one row and the bottom in the rows adjoining. Flat locked cross seams are thereby staggered in rows across the roofs. Short lengths were also used on the two dormers.

Roof sheets were applied with 2-inch cleats, two nails to the cleat, cleat turned over the nail heads, cleats on 10-inch centers the length of the sheet and two cleats for the head.

One of the details shows the cross sections and contours of the cupola. The wood framing and sheathing was supplied by others. The sketches show the various profiles used in each of the six segments, each profile representing one piece of metal. The ball was hammered in the Smither shop; gores were first formed; these were soldered

(*Continued on page* 88)





# PULLING TOGETHER--

How does it happen that a crew having the bigger men and rowing in a better shell sometimes fails when put to the test? You know the answer—they have not learned to pull together when the going gets tough.

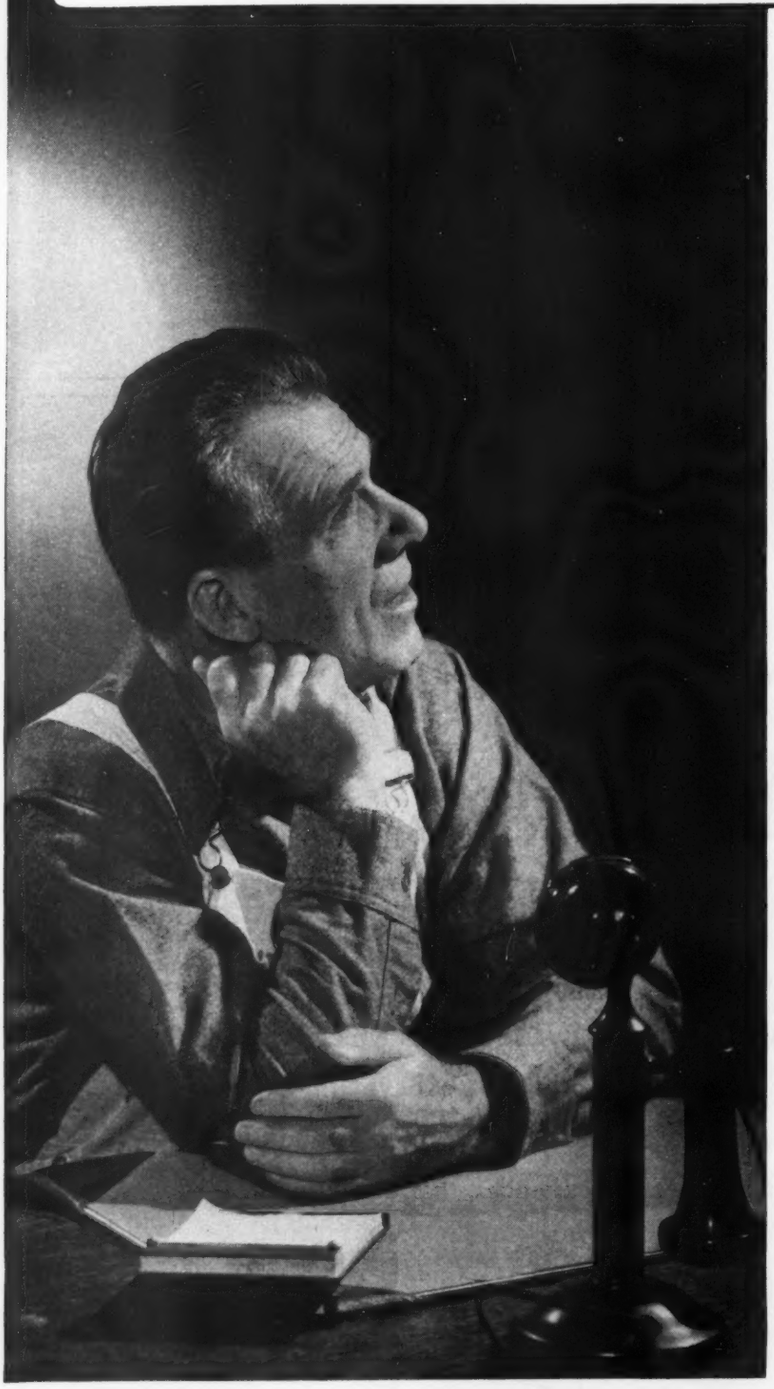
These are interesting times in which we live. Each day sees history being made; important new developments which influence our lives, as well as business conditions. We have little control over the course of events abroad, but our future here at home is entirely in our own hands. Let us remember this and that we are all team-mates in the same boat.

Ours is a fortunate nation. We will keep it so through our united efforts.

A DEPENDABLE SOURCE OF SUPPLY FOR 80 YEARS

THE J. M. & L. A.
OSBORN Co
Manufacturers—Distributors
BUFFALO · CLEVELAND · DETROIT
*Metals and Metal Products*

# "LISTEN, FRED! YOU'RE SNEEZING AT HONEST BUCKS!"



**FRED:** Me?

**LITTLE GUY:** Yes, you!

**FRED:** Why?

**LITTLE GUY:** Because you're not selling filter replacements.

**FRED:** How can I? *My* customers don't even know their forced warm air furnaces *have* filters.

**LITTLE GUY:** Wrong, Fred. They know they've *got* them—have got to *change* 'em—and that they *should* get Dust-Stops.

**FRED:** Sez *you!*

**LITTLE GUY:** *No!* Sez the big advertising campaign on Dust-Stops in Life, Saturday Evening Post, Better Homes and Gardens, and American Home.

**FRED:** Hummph! A lot of good that does me.

**LITTLE GUY:** Listen, Fred! Plenty of those people who know about Dust-Stops from the ads live right in your neighborhood, and will change their filters if they know where to get them.

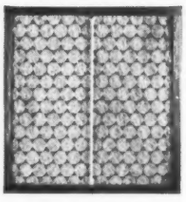
**FRED:** Say—I'd better get on the phone.

**LITTLE GUY:** Right! And use the free postcards and envelope stuffers the Dust-Stop people have for you. They'll pull in a whale of a business, too.

**FRED:** Not a bad idea!

**LITTLE GUY:** It's a *great* idea—especially when you make a nice profit on Dust-Stops. And don't forget the other services you can sell once you have your foot in the door.

**FRED:** I won't. And if you catch me sneezing at honest bucks again, kick me, Little Guy. Just kick me!

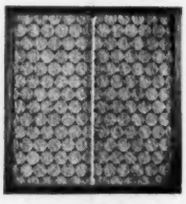


*You can make a lot of extra money this year on*

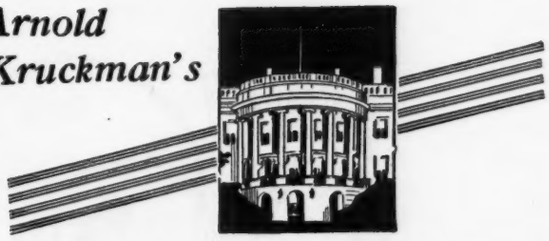
## FIBERGLAS* DUSTOP* AIR FILTERS

*T. M. REG. U.S. PAT. OFF.

*Manufactured by Owens-Corning Fiberglas Corporation, Toledo, Ohio*



*Arnold Kruckman's*



# Washington Letter

HARRY HOPKINS to most voters is the Secretary of Commerce; but one driving force that is remaking the Department is Edward Noble for whom the Congress less than a year ago created the office of Undersecretary of Commerce. Noble, multimillionaire maker of Life-Savers, came into the government as Chairman of the Civil Aeronautics Authority, is a big business man in every sense of the word; and he has around him other business men, a small but picked group, who have lived in business as a practical experience and who are specialists in various aspects of practical business. Each of these men, including Noble, have the real business man's distaste for the glare of publicity, if not exactly the passion for anomymity once suggested by the President.

### New Key Men

These men are the first group of real business men who have been given a genuine opportunity to exercise full authority in responsible positions in the government of this administration. The group includes James W. Young, a Chicago business man, who came into the Department recently as Chief of the Bureau of Foreign and Domestic Commerce. Also from Chicago came F. Stirling Wilson, a Sears, Roebuck & Co. man. From other business centers came Robert L. Davison of the American Radiator and Standard Sanitary Corporation; James Hughes of the Standard Gas Equipment Co.; Dudley P. K. Wood of the American Machinery and Foundry Co.; Carroll Wilson of Scudder-Stevens & Clark; and Stuart Guthrie of Niles-Bement-Pond Co. This is the core of the organization that is being integrated in the Commerce Department for the major purposes of placing the chief emphasis on domestic commerce and to give concrete, specific help to the business man. They are trying to put in the department everything the business man, small or large, wants to find in the government department that is devoted to his interests. And they are trying to do it in the way the business man does it.

### To Stress Domestic Commerce

For the past several years the commerce department has been chiefly focussed on foreign commerce. Its staff has largely been composed of technologists, scientists, and professionally trained experts, most of them the best men and women of their kind in the world. There have not, however, been many officials trained in the practice of business. It is natural, therefore, that the liaison between the business man and the official of the commerce department has not been very close. They did not always speak each other's language. The process of reshuffling the Department of Commerce naturally has some of the aspects of making an omelet; when you make an omelet you must break eggs. In this instance the breaking of the eggs has inevitably upset some of the fine people who have long been part of the Department. But it seems probable the new Department of Commerce will be in full swing by January 1st.

### Need Low Cost Houses

Mr. Davison is a housing authority. He feels that residential housing construction will not get into full stride until the building industries are able to produce a four-room home with heating and plumbing equipment that the family with an income ranging from $900 to $1,500 a year may purchase for, possibly, $2,000, and not more than $3,000. He thinks this may be accomplished if the building industries will coordinate their research activities and clear the resources assembled by research through a common center. Apparently it is the intention the commerce department shall become the research engine for this purpose, and act as the clearing house.

### Washington's Facilities

Research for **all** business in **all** fields is one of the major objectives of the re-organized commerce department. Big business has been able to maintain highly paid and finely trained research organizations in the Capital to avail itself of the extraordinary accumulation of information and data in the many agencies of government—its 300 libraries, its laboratories, its museums and in the minds and experiences of the thousands of experts in the employ of the government. Now, the commerce department proposes to act as research worker for **all** business men, no matter how small, thus placing the resources in Washington and elsewhere at the service of the small business man as well as the large business institution.

### Research for Everyone

One phase of this work is already being conducted by the commerce department Business Information Service. The business man, anywhere, who writes to the service for any information, receives every fact and every counsel that is available, without cost. It particularly welcomes practical questions. It will give you a market analysis that will apply to your region; or advise you about a new location; or about taxes, local, State or Federal; or it will give you counsel

(*Continued on page* 88)

OUR MEN are fully insured which protects YOU
WARNING TAKE NO CHANCES
A Clean Furnace Means a CLEAN HOME
Deadly Monoxide Gas
Protect Your Family's Health
If when coaling your furnace, gas and smoke fumes are noticeable in your home, by all means have this condition remedied. Only a few dollars may correct this trouble.
Our heating engineer will gladly advise and estimate the cost on resetting and needed repairs without charge.
U. S. Department of Commerce Says:
THE COST OF SOOT IN YOUR FURNACE
Heat Loss
Soot
Loss per Ton of $10 Coal
9.8% 1/32-in. $ .98
26.2% 1/16-in. 2.62
45.2% 1/8-in. 4.52
62.0% 3/16-in. 6.20
Wyoming Heating Company
19th & Thomes
Cheyenne, Wyoming
PHONE 0737
FOR AN ESTIMATE
BACKED BY YEARS OF Satisfactory SERVICE
OUR Representative Will Call Tomorrow
—ACT NOW!—
—FOR HEALTH and ECONOMY NEXT WINTER—
Why You Should Have Your Furnace Cleaned and Inspected Now
Cleaning prevents rust and corrosion, it will make your furnace last much longer and save fuel (Statistics on reverse side). Having your smoke pipe cleaned now may save buying a new one next fall.
VACUUM CLEANING
We clean by a new vacuum process—Enough suction to clean thoroughly but not enough to suck cement from furnace joints or ruin chimneys by removing loose mortar and destroying draft.
WHAT WE DO FOR YOU
Take down smoke pipe, clean it and erect it, clean base of chimney flue, clean furnace, radiator, flues, fire pot and ash pit, oil pulleys, regulate drafts, cement around feed door, paint front. We do this without muss, fuss or dust.
(over)

**Front and back of the door knob hanger distributed the day before the salesman's canvass to announce his call and focus attention on the cleaning and inspection service.**

# Cold Canvass Still Sells the Most Heating Job

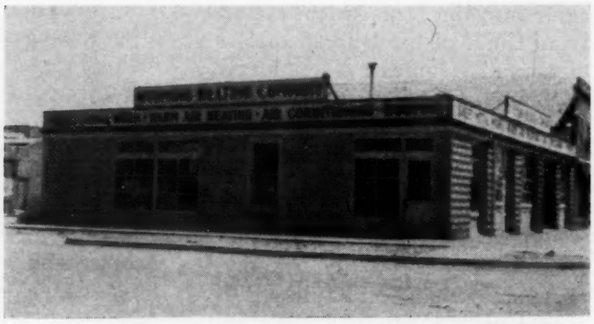
By John T. Bartlett

WYOMING HEATING COMPANY, Cheyenne, recently remodeled its building to provide a modern 14x50 foot general office and sales room. With excellent lighting, both natural and electric, and an attractive room color scheme, the company has excellent display facilities. In newspaper advertising, the company is aggressive. But John Cook, manager, declares that, in aggressive sale of heating jobs, one plan counts for much more than all others put together—cold canvass!

**Wyoming Heating Co. tries to sell modern equipment whenever possible. Above is such an installation sold from a cold canvass service call.**

Says Cook, "There is just one way to intelligently build furnace sales and that is to go out after them, systematically. In such a program, the cold canvass is basic. No sheet metal shop, in my opinion, can hope to get along without it. In our community there are hundreds of homes which need modern heating. In a great many cases, owners are easily in a position to finance the improvement. The logical thing to do is to go after that business."

Sometimes the Cheyenne company prepares the way for salesmen on cold canvass by having door-knob hangers distributed at a cost of 50c a hundred a day in advance of the salesman's visit. This



**Office, show room and shop of the company—attractive, clean, business-like and confidence inspiring.**

PROSPECT CARD DATE Sept. 28/ 39

ADDRESS (RES.) 212- 2nd Ave

NAME L. O. Heller PHONE (RES.) 2173

OCCUPATION Conductor .U.P.

NEW BLDG.-TYPE CONTR. ARCH.

OLD BLDG.-TYPE Brick Ven. CONDITION Good

TYPE OF PRESENT HTG. SYSTEM Warm Air Gravity

DOES IT HEAT SATISFACTORILY? Yes

TYPE HEATER Cast NO. OR SIZE 22 in. CONDITION Good

SALESMAN'S NAME J. C.

USE REVERSE SIDE FOR ADDITIONAL REMARKS

REMARKS

PRESENT ACCESSORIES Stoker (HUMIDIFIERS, THERMOSTATS, OIL BURNER, STOKER, ETC.)

ROOF TYPE

SIDING

INSULATION

GUTTER

ESTIMATE

Above—Two sides of the prospect card filled out for each inspection and filed in the office for future use. Note the completeness of the data tabulated.

◆

Right—A shop Work Sheet is filled in and filed for every job. This constitutes a complete record of the mechanics who worked on the job, their time by days and hours and labor rate; the amount of material; the equipment installed; material returned unused; selling price and actual cost; and the profit. These sheets are mimeographed.

☐ Time and Material WORK SHEET ☐ Contract $300.00

Job No. WYOMING HEATING COMPANY

Contractor: W. Longfellow Owner: Shelly

Install Furnace (Type of Work) 3055 1st Ave. South (Street Address) Cheyenne, Wyo. (City) 1939 (Phone)

Work to be done at 204 E. Third (Address) Cheyenne, Wyo. (City)

| Workmen | Date | 29 | 30 | 1 | 2 | 3 | 4 | 5 | 6 | Tot Hrs | @ | Lbr Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Allen | 6/29 | 6 | 5 | 8 | 1 | | | | | 20 | 40 | 8 00 |
| Slim | " | 6 | 8 | 6 | | | | | | 20 1 | 25 | 25 00 |
| Sandy | " | 6 | 8 | 6 | | | | | | 20 1 | 25 | 25 00 |

| Date | Material taken on Job | Price |
|---|---|---|
| 7/1 | One G-2 Lennox Gas Fired | $ 90 00 |
| 7/2 | 10# Asbestos Paper @ 10¢ | 1 00 |
| " | 40# Galvanized @ 6½¢ | 2 60 |
| " | Electrician | 10 00 |

| | |
|---|---|
| Total Labor Cost | 58 00 |
| Add Cost of Material | 105 60 |
| Tax on Material | 1 87 |
| Commission | 9 00 |
| Total Labor and Material | 174 47 |

| Date | Material Returned | |
|---|---|---|
| | 20# Galvanized | 1 50 |
| | Less Material Ret'd | |

NET COST:

| Estimate | Cost | Profit |
|---|---|---|
| $300 | $175.17 | $126.83 |

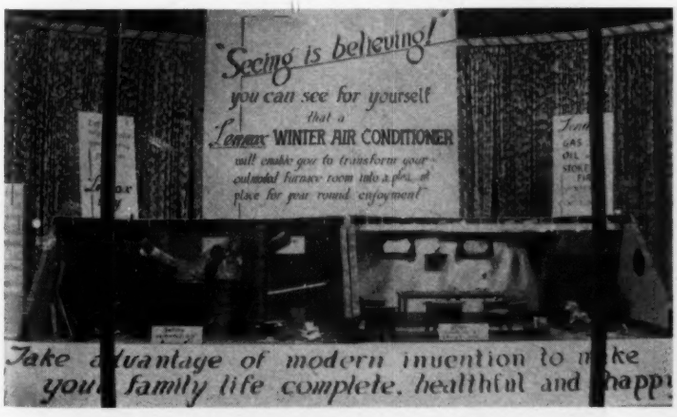
Remarks:

Completed: 7/3/39

Signed: John Cook

advertising is fairly certain to be read and it tends to prepare home owners by turning their minds toward heating problems. But, mostly, each call is strictly cold-turkey. The salesman walks up to the door, rings the bell, and politely introduces himself—offering to make a free examination of the heating plant.

For a good salesman, Cook says, cold interviewing of this type is not disagreeable work. Many sheet metal men never undertake it on any scale because the inevitable high preponderance of turndowns get on their nerves. They shrink from possible rudeness at the front door. But, in practice, a salesman of good appearance, who is tactful and confident and who greets the housewife with a smile, plainly expecting courteous treatment, practically always receives courtesy. For the rest, he acquires a philosophy of mathematics. He knows that most calls will be unproductive, but inexorably a percentage will be favorable.


"Seeing is believing!"
you can see for yourself
that a
Lennox WINTER AIR CONDITIONER
will enable you to transform your
cultivated furnace room into a place
Take advantage of modern invention to make
your family life complete, healthful and happy

Window displays, in the home office and in down-town store windows are used frequently. At the left is a "before and after" attractively backgrounded and placarded. At right—The same models, less ornamented, but effectively used to tell the story of remodeling.

SERVICE ORDER NO.____

To Wyoming Htg Co
Dealer's Name

19 + Thomas Chey
Address City

You are hereby authorized to do the following work on the heating plant in our property at

212 - 2nd Ave Street
Cheyenne City

| | | |
|---|---|---|
| Reset Cast Furnace | | $15.00 |
| Clean | | $ |
| Clean 6 Warm Air Pipes @ 50¢ | | $3.00 |
| Clean 4 Cold Air " @ 50¢ | | $2.00 |
| Replace Smoke Pipe (____ In Size) | | $ |
| Install new CA in | | $ |
| N.W. Bedroom | | $12.00 |
| | Total | $32.00 |

Date To Be Done Sept 28/39

When this service has been completed we agree to pay the entire amount to your operator.

(Signed) Leo Aeller

Street 212 - 2nd Ave

Phone No.____ Date 9/28/39

Original-Dealer's Copy

COMPLETION CERTIFICATE

The work on Service Order No.____ has been satisfactorily performed and I have paid the operator

$____

Date____

Owner____

Serviced By Dewey + Slim
(Operator's Name)

SERVICE ORDER NO.____

To Wyoming Htg. Co
Dealer's Name

19 + Thomas Chey
Address City

You are hereby authorized to do the following work on the heating plant in our property at

212 - 2nd Ave Street
Cheyenne Date

| | | |
|---|---|---|
| Reset Cast Furnace | | $15.00 |
| Clean | | $ |
| Clean 6 Warm Air Pipes @ 50¢ | | $3.00 |
| Clean 4 Cold Air Pipes @ 60¢ | | $2.00 |
| Replace Smoke Pipe (____ In Size) | | $ |
| Install new CA in | | $ |
| N.W. Bedroom | | $12.00 |
| | Total | $32.00 |

Date To Be Done Sept 28/39

When this service has been completed we agree to pay entire amount to your operator

(Signed) Leo Aeller

Street 212 - 2nd Ave

Phone No.____ Date 9/28/39

Duplicate-

DEALER'S OFFICE RECORD No.____

Customer____

Address____

Original (Job ticket) given to

Operator's Name Date

Completed Dewey + Slim

SERVICE ORDER NO.____

To Wyoming Htg. Co
Dealer's Name

19 + Thomas Chey
Address City

You are hereby authorized to do the following work on the heating plant in our property at

212 - 2nd Ave Street
Cheyenne City

| | | |
|---|---|---|
| Reset Cast Furnace | | $15.00 |
| Clean | | $ |
| Clean 6 Warm Air Pipes @ 60¢ | | $3.00 |
| Clean 4 Cold Air " @ 50¢ | | $2.00 |
| Replace Smoke Pipe (____ In Size) | | $ |
| Install new CA in | | $ |
| N.W. Bedroom | | $12.00 |
| | Total | $32.00 |

Date To Be Done Sept 28/39

When this service has been completed we agree to pay entire amount to your operator

(Signed) Leo Aeller

Street 212 - 2nd Ave

Phone No.____ Date 9/28/39

Triplicate--Customer's Copy

RECEIPT

Date____ Service Order No.____

Received From

$____

Dealer____

By____

Dewey + Slim

**An important record is the Service Order reproduced at the left. The order folds three ways, using two carbons. One sheet is given the customer (right) to show just what is proposed and bears a receipt which the firm signs when final payment is made. The center sheet (shown reversed) is a duplicate dealer's record for the mechanic or salesman and carries a job record which refers to the Work Sheet. The left sheet is the dealer's original record and bears a certificate which the customer signs on completion and payment to signify that the job was installed according to the contract and specifications.**

From his company's records John Cook states—"A good salesman will get into the basement about once in five calls."

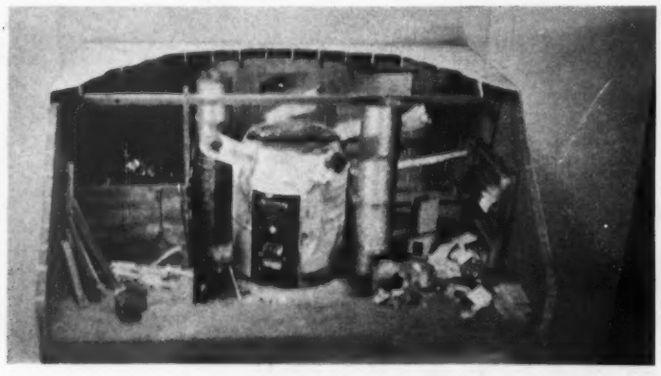
Wyoming Heating Company puts cold canvass on a strict schedule basis. Salesmen are expected, in a general way, to spend the hours from 8 a. m. to 11 a. m., and 2 p. m. to 4:30 p. m. in cold canvass—always assuming, of course, that other sales interviews aren't on the docket. This is the basic selling routine. Adhered to, it means that there are always live prospect situations which are having expert attention, a percentage of which materialize in sales.

The company insists that salesmen have a working knowledge of heating systems. He must do a business-like job of inspecting equipment and condition.

"In fifty per cent of the cases," says Mr. Cook, "the salesman can make a sale of some sort—a cleaning job, a new grate or fire bowl, a shaker, a reset job. The heating systems of Cheyenne in this respect are undoubtedly typical. These small sales that the salesman who gets into the basement make, help out nicely in meeting cold canvass expense.

The main purpose of inspection is not, of course, the incidental sales. The salesman is on the trail of leads for new heating installations. When conditions appear at all favorable, he begins to work up interest in such betterments as modern heat (more even, properly humidified, cleaned air). He tells of the clean basement possible with new systems.

One primary objective, of course, is a second interview. "Good salesmen," remarks Mr. Cook, "make their own appointments. It just doesn't do when a housewife, for example, shows some interest, to leave the home on the basis that she will



**Closeup of the "before and after" models with everything in miniature. Note how effectively this display tells the story of usable basement space with modern heating equipment and inexpensive modernization.**

talk the matter over with her husband and then get in touch with the salesman. Conceivably, such an arrangement may actually result in the important second interview; but the chances taken are altogether too great. It is up to the salesman to arrange for the call back."

And they make them as quickly as possible after the first contact. "When will it be convenient for you and your husband to have me come back—this evening, 7 or 7:30 p. m.?" The psychology assumes that a second interview is wanted, and gives the prospect a choice to make (7 or 7:30 p. m.) This is very effective.

### Night Calls Indispensable

Many of the interviews are scheduled for the evening. The Wyoming Heating Company, says Mr. Cook, makes at least 50 per cent of its sales at night and some night work has entered into an even higher percentage.

"The heating salesman," believes this Cheyenne manager, "must take his night calls in stride; night calls are a part of the job. So long as the salesman fights and avoids them, his sales are bound to be affected. It is the only practical way to get husband and wife together and to apply the pressure which gets the final favorable decision.

"Conditions for making sales in the evening are often so wonderfully good that the heating salesman of any experience is likely to become happily reconciled to the method. When the family has had its evening meal, when there is the relaxed condition of nerves which comes at the end of the day, when the disposition is to be sociable, a salesman with spirit and energy can do a wonderful job of selling. His listeners aren't pressed for time. He can make a real showing.

"My observation is that a salesman gets into a special rhythm of activity so that putting in the important and productive work of the daylight hours, he conserves his energy and is at his best form in the evening."

One of Mr. Cook's interesting methods is use of snapshot photos showing new installations. The picture of a new furnace in a clean basement makes a big impression. He also uniquely demonstrates modern furnaces in window displays. One of his most effective displays showed sections of two basements, side by side, in miniature. One was a typical disorderly, ugly basement, with obsolete heating equipment.

The other room presented a modern heating plant, with neatness and space economy.

### Comment on Records

Says Mr. Cook of the forms shown: "The service orders are used by the salesman in soliciting any type of furnace work that is of a minor nature. He fills in the type of work to be done, at the same time quoting a price on the job and getting the customer to accept. The salesman gets a copy; one copy is returned to the office and entered with the work sheet to become a permanent record. The third copy goes to the workman and authorizes him to do the job.

WYOMING HEATING CO.

MATERIAL SCHEDULE

Salesman: Date: ( ) C.P. ( ) Contract

Sold To: Address: Phone No.

| | | |
|---|---|---|
| B.B. W.A. Reg. | S.W. W.A. Reg. | Floor C.A. Reg. |
| B.B. W.A. B.X. | S.W. W.A. Hds. | B.B. C.A. Reg. |
| B.B. W.A. Rt. | Riser Boots | Smoke Pipe |
| Ft. Glv. Tin | Ft. Riser Pipe | Smoke Ells |
| | | Smoke Damper |
| Glv. Tin Ells | No. Riser Ells | Ash. Paper |
| | | Dry Paste |
| | | Fce. Unit |
| Glv. Tin Angles | No. Riser Ang. | Casing & Hood |
| | | Filters |
| | | Humidifier |
| | | Oil Burner |
| W.A. Dampers | Ft. Glv. Duct | Blower Unit |
| | | Stoker |
| | | Controles |
| W.A. Collars | No. Glv. Ells | NET COST MATERIAL |
| | | Roof Material: |
| | | Rolls 30# Felt |
| | | Rolls 15# " |
| | Miscellaneous | Lb. Asphalt |
| | | Cloth Flashing |
| | | Metal Flashing |
| | | Mops |
| | | Oil |
| | | LABOR COST |
| | | NET COST L&M |
| | | OVERHEAD |
| | | NET PROFIT |
| | | GRAND TOTAL |

**The Material Schedule above is filled in by job. On this is entered, by equipment items and material required, all the requirements of the job. These items and materials are filled in as the job is accumulated in the shop. Later these costs and materials are transferred to office records.**

"When the job is completed the work sheet is taken from the active file for work in progress, charged and entered in the ledger. It is then filed alphabetically in the 'job completed' file.

"The material schedule is used when figuring a job of a major nature. This sheet is one which we just recently completed for quoting larger contracts and even now we find there are different items that have to be listed from time to time because of the fact they were not listed on the schedule when it was printed.

"We are now working toward the elimination of the work sheet by using the 'workman's job ticket' as a direct posting medium to the ledger sheets. We hope to accomplish this by using a separate ledger sheet for each major job. These sheets will carry a breakdown between labor and material used on the job and will remain intact in the 'accounts receivable' ledger book."

# Gravity and Mechanical Heating Code With Licensing, of Columbus, Ohio

**This chapter concludes publication of the Columbus, Ohio, ordinance. Attention is again called to sections of this code which specify how work shall be designed by referring to codes published by the heating industry. Where this is legal, this is one method of shortening the ordinance, presuming that contractors and inspectors alike have copies of the codes referred to. We caution contractors to get a legal ruling on this method before preparing their code.**

Section 14: Apartment Buildings.

a. As many apartments may be heated off one furnace as capacity will permit, provided that enough outside air is permitted to equal the return air from the largest apartment.

b. Gas forced air furnaces in utility rooms: Gas furnaces will be permitted on any floor of a building where a utility room has been provided with an outside vent to support combustion, also, a flue of masonry or asbestos equal to number of square inches of fume pipe. Such utility room shall have two inch hollow tile floor or equal, with wall and ceiling insulated with rock lath on spring clips of U. S. Gypsum or equal.

Section 15. Work to be Done by Others:

a. The plumbing contractor is to leave proper size gas outlet at side of furnace in new building, when gas is to be used as fuel.

b. The electrical contractor is to leave electric outlet on separate circuit at furnace for blower and thermostat.

Section 16. Garage Heat: When heat is provided in garage the outlet shall be located at least six feet above the floor and shall be provided with a balance back draft louvre to prevent syphoning of air from the garage to other portions of the system.

Section 17. a. In winter air conditioning heating systems air shall be returned from every room except kitchen, lavatory and bath. There shall not be more than one return register or grille on one wall stack or stack head. Ten per cent of air supply shall be taken from outside of building.

b. Minimum requirements for estimating heat loss: CFM and duct sizes for buildings up to 125,000 BTU shall be taken from the January 1st, 1939, edition of the Technical Code of the National Warm Air Heating and Air Conditioning Association, which is made a part of this ordinance. Furnace size to be determined in accordance with article 4 of the January 1, 1939, edition of the Technical Code of the National Warm Air Heating and Air Conditioning Association.

c. Buildings from 125,000 to 250,000 BTU heat loss shall be taken from the January 1st, 1939, edition of the Technical Code of the National Warm Air Heating and Air Conditioning Association, which is made a part of this ordinance.

Section 18. Violations and Penalties. Any person duly licensed as required by this ordinance to supervise or perform any installation of work governed by this ordinance who shall, as such licensee, take out or secure a permit for work to be done by any person or persons not connected with such licensee nor in the employ of such licensee, or who shall allow his name to be used by any other person, persons, firm or corporation for the purpose of either doing any of such work, or obtaining a permit therefor, shall, upon conviction thereof, be subject to a fine of not less than fifty dollars nor more than one hundred dollars and, in addition thereto, his license shall be suspended for a period of ninety days.

Section 19. Any person, persons, firm or corporation who shall install in any building, structure, or enclosure in said city, any apparatus, articles or equipment for winter air conditioning as defined in this ordinance, which does not comply with the requirements of this ordinance for winter air conditioning shall be guilty of a violation of this ordinance and shall be subject on conviction thereof, to a fine of not less than fifty dollars nor more than one hundred dollars for the first offense; and for the second and each subsequent offense not less than one hundred dollars nor more than two hundred dollars.

Section 20. Any person, persons, firm or corporation who shall violate any provision of this ordinance or fail to comply with any of such provisions, except where a specific penalty is otherwise provided herein, shall be subject, on conviction thereof, to a fine of not less than five dollars nor more than twenty-five dollars for the first offense, and for the second offense not less than ten dollars nor more than fifty dollars and for any subsequent offense not less than fifty dollars nor more than one hundred dollars; and in addition thereto any license theretofore issued to such offender may be revoked by the court on finding such licensee thus guilty; and where such a violation is of a continued nature, each day any such person, persons, firm or corporation

(*Continued on page* 88)

## National

According to President Taylor of the National Warm Air Heating and Air Conditioning Association the program and elaborate arrangements for that organization's next convention are practically complete. This important event is to be held in the Hotel Hollenden, Cleveland, January 22-25, 1940—the Winter Meeting of the American Society of Heating and Ventilating Engineers and the Bi-ennial Air Conditioning Show of the International Heating and Air Conditioning Exposition being on concurrent dates.

Monday, January 22nd, will be occupied by meetings of the Association's Board of Directors and its several standing committees.

The convention proper opens Tuesday morning, January 23rd, in the Hollenden's Grand Ballroom with a keynote address by President Taylor.

One interesting feature will be the Bi-ennial Joint Meeting of the National Warm Air Heating and Air Conditioning Association and The American Society of Heating and Ventilating Engineers with the Presidents of both organizations sharing the honors as chairman.

Another, the presentation of recent and important developments from the Association's Research Activity which has been carried on for twenty-four years in cooperation with the University of Illinois.

Many other topics which will be discussed by nationally recognized authorities will cover all phases of the industry.

All present are to enjoy the Association's DeLuxe Smoker at 10:00 p. m. Tuesday evening, January 23, to which the members of the American Society of Heating and Ventilating Engineers and those attending other meetings of kindred organizations in Cleveland that week are all invited to attend. Those at the convention of the National Warm Air Heating and Air Conditioning Association will also have a cordial invitation to attend the Annual Banquet and other social features of the American Society of Heating and Ventilating Engineers.

A special inspection of the huge strip mill of the Republic Steel Corporation is scheduled for Thursday morning, January 25th.

Every Manufacturer, Heating Contractor and Jobber in the Industry is cordially invited to be present.

Allen W. Williams, Managing Director.

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## Sheet Metal Distributors

The National Association of Sheet Metal Distributors, affiliated with The National Wholesale Hardware Association, held their 45th annual convention at the Marlborough-Blenheim, Atlantic City, N. J., October 16 to 19, and elected the following officers and members of the Executive Committee:

President—A. W. Howe, The J. M. & L. A. Osborn Co., Cleveland, Ohio
Vice Presidents—A. J. Becker, Ohio Valley Hardware & Roofing Co., Evansville, Indiana
Eugene Foley, Bayonne Steel Products Co., Newark, N. J.
Secretary-Treasurer—George A. Fernley, Jr., Philadelphia, Pa.
Executive Committee (1939-1942)
John M. Burbank, Farwell, Ozmun, Kirk & Co., St. Paul, Minn.
A. H. Nichols, Buhl Sons Company, Detroit, Mich.

George A. Fernley, Secretary-Treasurer.

## Illinois

A meeting of the Legislative Committee of the Sheet Metal Contractors Association of Illinois has been called for the purpose of conducting an open hearing and discussion on a proposed act to license warm air heating contractors throughout the state.

The meeting is to be held at Hotel Jefferson, Peoria, Illinois, at 1:00 p. m., Saturday, December 2, 1939. Warm air heating contractors are urged to attend and discuss the proposed legislation.

A draft of the text will be mailed to whomever will register his name with the Chairman of the Committee.

The members of the Committee are available to meet with groups to discuss this important legislation which will be placed before the General Assembly.

J. E. Peterson, Chairman, Legislative Committee, 20 West Hinsdale Avenue, Hinsdale, Illinois.

◆

## Wisconsin

The Master Sheet Metal, Heating, Ventilating & Air Conditioning Contractors Association of Wisconsin, Inc., met on October 14 at the Knights of Pythias Hall, corner Avon and Clinton Streets, LaCrosse. Vice President Martin Scharr called the meeting to order in the presence of the LaCrosse members, Madison member and members of the Board of Directors.

Communications received from American Artisan, Snips Magazine, Sheridan Iron Works, Inc., of Sheridan, Wyoming, Department of Commerce, William Hielscher, Bernard Zahn, and on convention matters were read and disposed of.

The secretary reported that most of the booths for the exhibit at the coming convention were reserved and rented, that the Year Book—Buyers Guide advertisements—were rolling in in a satisfactory manner, that arrangements had been made with the hotel management.

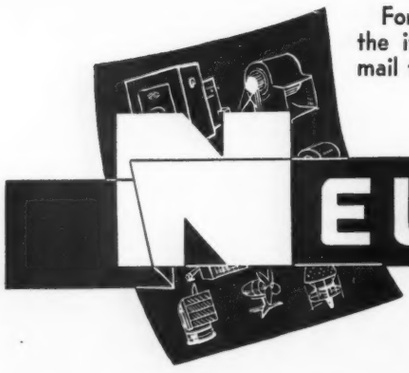
Director Zahn brought forth the unethical policy of jobbers and distributors selling direct to the consumer and after much discussion, the secretary was requested to lodge a complaint. Chairman Schaar cited the manner in which a similar case was disposed of in the Milwaukee territory.

The license matter was brought up for discussion, and LaCrosse seemed to feel that the State association should endeavor to bring about such a measure through our State legislature. It was suggested that a whole day be given to this important matter at the ensuing convention, that fifteen minutes be given to speakers on and asking for the floor, only, and that the matter be prominently publicized in our program, so that the entire industry and especially members will be in a position to know and enter into discussion.

Adjournment at 4:55 p. m. was followed by a splendid repast, with refreshments under the supervision of Mrs. Zahn, which all seemed to enjoy.

Refreshments were followed by music and dancing and story telling.

Paul L. Biersach, Secretary.



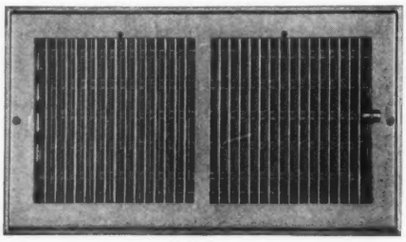
**For your convenience a number has been assigned each item. Circle the items in which you are interested on the coupon on page 84 and mail to us.**

● Indicates product not listed in 1939 Directory.
△ Indicates product and manufacturer not listed in 1939 Directory.

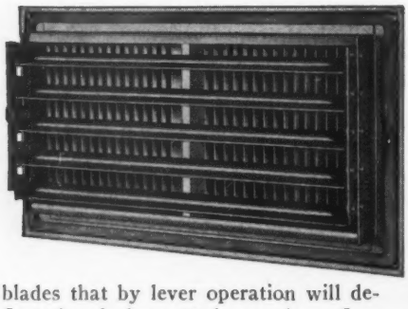
# NEW PRODUCTS

## 199—200 Series A. C. Registers

United States Register Co., Battle Creek, Michigan, announces the 200 line of registers—a duo-deflection line



that gives a right and left flow through the face to any adjusted degree of deflection required. An operating pin adjuster adjusts the groups of vertical blades in the grille from 45 degree right to 45 degree left. The register is also equipped with multi-louver back



blades that by lever operation will deflect the air from 45 degree down-flow to any desired degree of upflow.

The register can be used in connection with an installation where the flow of air is through the back of the register, or where the register may be set in an inverted stack-head.

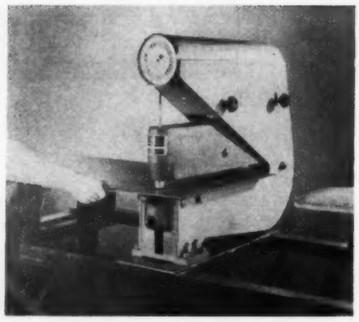
◆

## ▲ 200—Guyer Gauger

Streeter-Amet Company, 4101 Ravenswood Avenue, Chicago, has just placed on the market the Guyer gauger, a mechanical micrometer, designed to produce a fast, simple and accurate means of checking the thickness or gauge of metal sheets.

The throat of the machine is 23 inches deep clear of the measuring anvil which admits great latitude in exploring wide sheets for uniform thickness.

The dial is graduated in 0.001 inch increments so that any desired gauge



or tolerance may be readily established by means of adjustable dial rim markers. The dial tolerances represent the accuracy requirements of metal forming, drawing and stamping operations.

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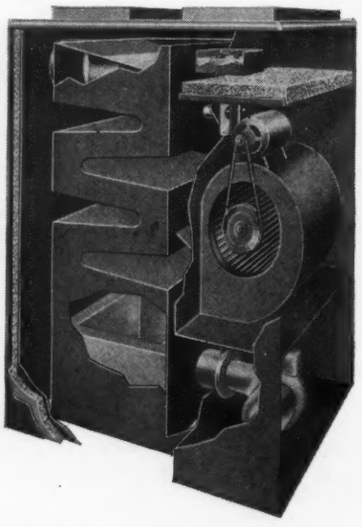
## ▲ 201—Penn Air Conditioner

Burner Parts & Service Corporation, Lancaster, Pa., announces the Penn automatic winter oil burning air conditioners rated at 65,000, 80,000, 95,000,



125,000 and 145,000 Btu at the register, in green, crinkle baked jacket, insulated with 3-ply air celled asbestos.

The Penn air conditioner includes a gun-type oil burner, removable filters, humidifier, blower and controls.

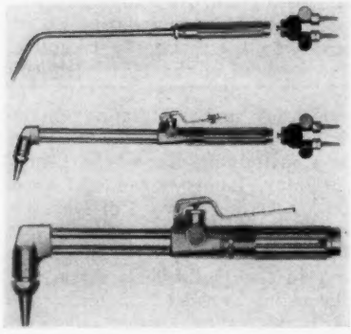
◆

## 202—Welding and Cutting

The Linde Air Products Company, unit of Union Carbide and Carbon Corporation, 30 E. 42nd St., New York City, announces a number of improvements in the new line of Prest-O-Weld welding and cutting apparatus. This new equipment consists of a welding blowpipe, cutting blowpipe, and cutting attachment. All retain the detachable valve body construction, which permits quick changing from welding to cutting, and cutting to welding.

The apparatus is available separately or in combination outfits.

Among principal features of the



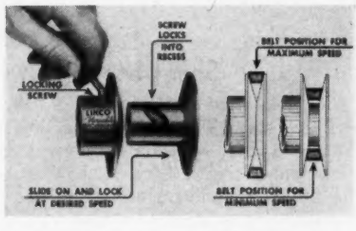
W-108 welding blowpipe are the individual mixers in every head making flame adjustment easy, and giving definite resistance to flashback. Both the oxygen and the acetylene may be set at approximately the same pressure in lb. per sq. in, as the number of the head.

The new C-108 cutting blowpipe and the CW-108 cutting attachment are also constructed on improved design principles. A lower preheat oxygen pressure permits a large flame for cutting material. Like the welding blowpipe, they have improved flashback resistance, are strongly built and well-balanced for ease of handling.

◆

## ▲ 203—Variable Speeds Pulley

The Linderme Machine & Tool Co., Inc., of Detroit, has developed a new V-type belt pulley that may be quickly adjusted to a variation of speeds. The


LOCKING SCREW
SCREW LOCKS INTO RECESS
BELT POSITION FOR MAXIMUM SPEED
SLIDE ON AND LOCK AT DESIRED SPEED
BELT POSITION FOR MINIMUM SPEED

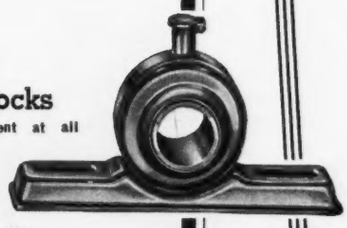
two separate parts of this pulley are sleeve fitting, so that they slide together.

One locking screw is required which, by a turn of an Allen wrench, tightens into recess as illustrated and locks pulley in desired adjustment.

*A Great Profit Line for 1940*

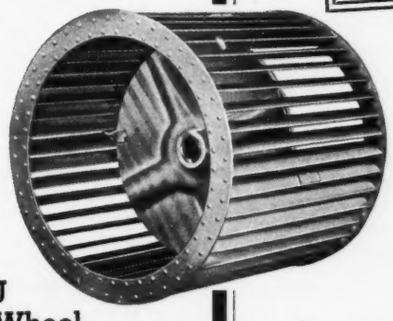
# LAU

## Furnace Blower Equipment



**LAU**
**Pillow Blocks**

Positive self-alignment at all times. Light weight, durable. Bearing housing die-formed from heavy gauge steel. Durex bronze bearing is lubricated through pores of bearing by capillary action . . . complete lubrication at all times.

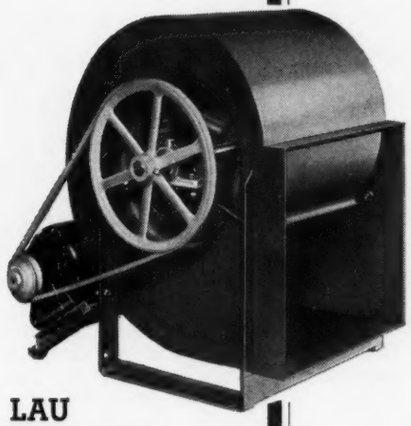


**LAU**
**Blower Wheel**

Squirrel cage, forward curve, multi-blade type wheels. Double inlet, double width. All die-formed parts. Dynamically balanced. Guaranteed true and without vibrations at operating speeds.

**LAU**
**Pulley Wheels**

Made from close-grained cast iron . . . accurately machined and balanced . . . true-running . . . silent. Also, variable speed pulleys with speed variations up to 30%.



**LAU**
**Furnace Blowers**

Low-speed, high delivery blower assembly. Variable speed drive. Automatic belt-tightening device. Automatic cut-out on motor. Rubber cushioned . . . eliminates noise and vibration. Available with top, side, and rear motor mounting. 20 sizes.

**New Sizes — New Designs — with a PROVED SALES OPPORTUNITY for You!**

LAU leads you to new profits—more thoroughly satisfied customers with a vastly improved line for 1940! New sizes—new designs—new products and equipment to widen your sales field—to bring you LAU superior performance for every type of application!

The progressive manufacturers and sheet metal men who have used LAU Equipment in the past, know the truth! You can design a piece of equipment—or you can correctly solve an old installation problem BETTER — MORE LASTING with LAU units. That's because LAU'S are precision-built . . . designed with knowledge and conscientiously manufactured to meet the requirements of the job—the absolute specifications—and the enthusiastic endorsement of the buyer. When you next need such equipment as we make . . . write for complete information covering the sizes, capacities, and the mechanical improvements and superiorities of LAU precision-built blower units . . . LAU housings, variable and constant speed pulleys, self-aligning pillow blocks, casing moldings and blower wheels. You'll find common sense rests in your judgment — more profit comes from your action. Write at once!

## Lau Blower Co.
934 E. MONUMENT AVE.
DAYTON, OHIO

# New Products . . . . . .

**For your convenience in obtaining information regarding these items, use coupon on page 84.**

## 204—200-Amp. Arc Welder

The Lincoln Electric Company, 12818 Coit Road, Cleveland, announces a new 200-ampere arc welder of the Lincoln Junior type with a range for many welding applications.

The new welder is single-operator, variable-voltage type and can be used with either bare or shielded arc type

electrodes. It has a current range of 60 to 250 amperes for welding duty.

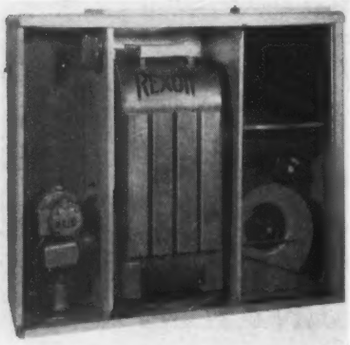
A feature is Lincoln't patented dual continuous control, permitting independent adjustment of voltage and current, giving complete and separate control of arc heat and arc penetration. Both voltage control and current control are self-indicating.

The welder occupies less than 4 square feet of floor space. A lifting lug facilitates crane handling.

◆

## 205—Rexoil Conditioners

Reif-Rexoil, Inc., 37 Carroll St., Buffalo, announces a new low-priced, direct oil or gas-fired winter air conditioner for the small home.




Model RA-85 has a maximum rating of 110,000 Btu at the bonnet. Specifications include a modern designed casing finished in two-tone Rexoil gray crinkle with removable side and front panels and chromium hardware. The generator or furnace is 10-gauge double-weld steel with side radiators and an inbuilt boiler-plate baffle.

A double inlet 12-in. blower is located in the rear compartment with raised motor and variable speed pulleys. Filters are of the replaceable type. Humidity is obtained through a stainless steel vaporizing pan mounted on the heat generator top and regulated by an improved float mechanism in the burner compartment.

A Rexoil pre-cast monolithic combustion chamber is used for both oil and gas firing.

A Rexoil BU special oil burner or a Model R-G Gun Type gas burner is located in the burner compartment.

A combination Rexoil furnace and fan switch provides high temperature limit control as well as blower regulation within useful ranges.

◆

## 206—Oil Air Conditioner

Perfection Stove Co., Cleveland, announces the addition of a new model Superflex oil-burning air conditioning furnace for small homes.

Occupying only two square feet of floor space, the new furnace, Model 90, burns No. 2 fuel oil and the maximum

fuel consumption is 65/100 gallon per hour. Radiator is installed in the warm air plenum chamber, supplying 70,000 Btu at the bonnet.

Burner is combination mechanical and natural draft, with factory wired built-in combination high-low oil and single speed blower control. Automatic controls include a thermostat and factory wired and built-in limit control, summer switch and electric assembly oil valve mounted on furnace. Drip type humidifier, with stainless steel evaporator.

Blower, 1000 cfm belt drive, ⅙ hp, single speed motor, 110 V., 60 cycle, single phase, alternating current, is factory wired and mounted in position.

Outer casing is 20 gauge steel, finished in orange-red and black "wrinkelac" enamel.

## 207—Windowstat

Julien P. Friez & Sons, 4 N. Central Avenue, Baltimore, announces new features incorporated in their Windowstat for the prevention of condensation on windows or other chilled surfaces.

The Windowstat employs the Friez patented human hair element which detects the approach of condensation, and through its electrical contacts either overrules the ordinary humidity control, shutting off the humidifier, or acting as an independent control, starts fans, heaters or other dehumidifying equipment.

◆

## ▲ 208—Marion Air Conditioners

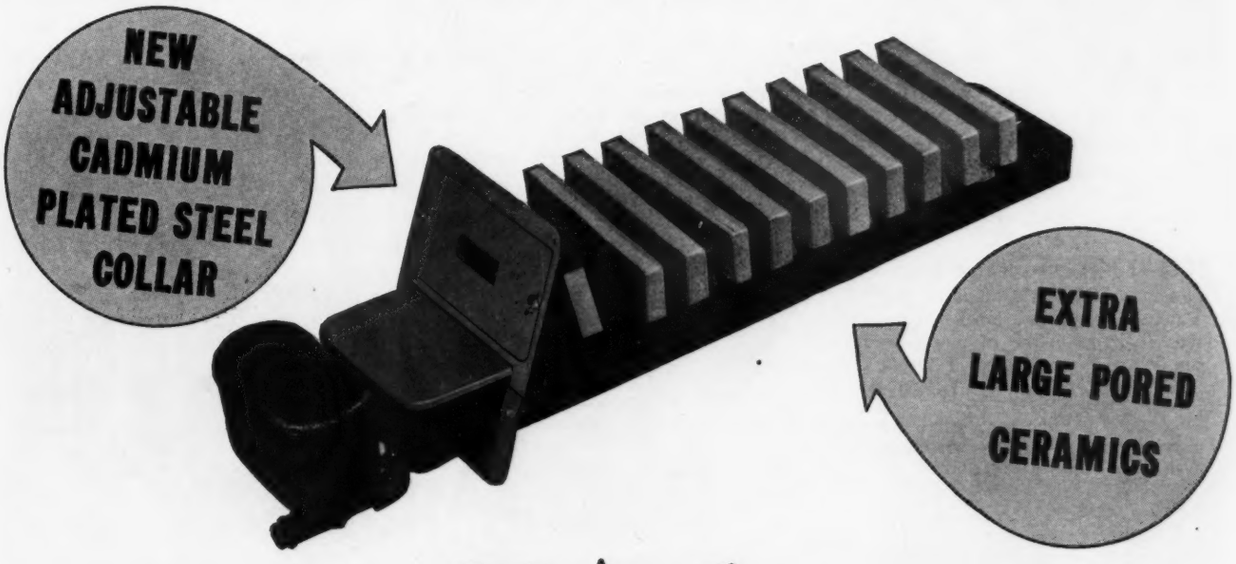
The Marion Furnace Co., 2970 West Grand Boulevard, Detroit, with factory located at Marion, Ohio, offers two gas and two oil fired air conditioning furnaces.

Barber gas burners and Aldrich oil burners are standard equipment.

The combustion chamber, heat exchanger, and flue are solidly welded into one integral piece. All accessories —controls, filters, blowers, humidifiers, etc.—are standard equipment.

The units are compact—yet easily accessible for servicing. They are finished in Copper Hammerloid, with black trim, baked enamel. The casings are of furniture steel, die-cut and formed.

A FEW DROPS OF WATER and the Skuttle line of automatic humidifiers can ring up more sales and profits for you this year. Because the Skuttle humidifiers are simplified in design (there are no glass parts to break or complicated mechanism to get out of order) they are trouble-free in operation and are more easily and quickly installed. This, of course, saves time and money on each installation and eliminates service calls, for a Skuttle humidifier, once installed, is dependable and entirely automatic in its operation. The illustration below is an unretouched photograph of the Skuttle automatic humidifier with the ceramic unit in place, ready to be inserted in the bonnet or plenum chamber of the furnace. The new adjustable cadmium plated steel collar allows the changing of the ceramic units without taking out the whole humidifier assembly—another time and money saver that is an exclusive Skuttle feature. We can't tell you all about the Skuttle features in this space, so write us for descriptive literature and the low prices of these units.




WRITE TODAY FOR Skuttle INFORMATION

J. L. SKUTTLE COMPANY

AUTOMATIC HUMIDIFIERS

999 FRANKLIN ST., DETROIT, MICH.

# New Products . . . . . .

**For your convenience in obtaining information regarding these items, use coupon on page 84.**

## 209—Portable Bench Grinder

Speedway Manufacturing Company, 1834 South nd Avenue, Cicero, Illinois, announces a new portable bench grinder. The new "119" comes in a

streamlined cast housing with two-tone finish of blue crackel and lacquered white metal, sets firmly on 4 rubber feet, comes complete with 110 volt A. C. motor, one fine grinding wheel and one coarse, and a 6-ft. cord. Dimensions are 10¼x6½x6½ inches.

◆

## ▲ 210—Metal Mercury Switch

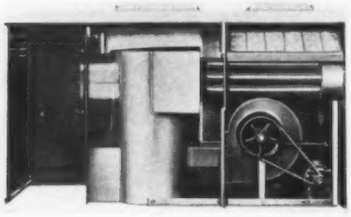
Durakool, Inc., 1010 North Main St., Elkhart, Ind., announces their recently improved mercury switch, suitable in

maintenance contact problems, from wall switching to motor starting available up to 200 amp. capacity.

◆

## 211—1940 Directaire Line

Fitzgibbons Boiler Company, Inc., 101 Park Avenue, New York City announces their 1940 line of direct-fired air conditioners in a range from 80,000 Btu to 600,000 Btu.



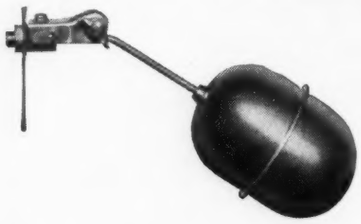
All units are constructed of sturdy copper bearing steel plates and fire tubes all electrically welded into a one-piece heat exchanger providing freedom from the leakage of dust, gases and products of combustion.

The Special Eighty and 120 Directaire is illustrated.

◆

## ● 212—Float Valve Assembly

Viking Air Conditioning Corporation, 9500 Richmond Ave., Cleveland, announces the acquisition of the manufacturing rights to a top seat water level control valve and humidification



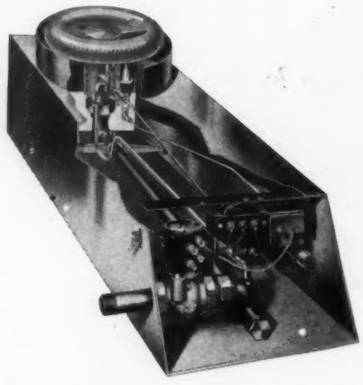
equipment, which has been improved.

The top seat arrangement of the assembly permits the valve to be examined and cleaned in place without disassembling any part. By loosening the adjustment wing nut which permits the float to remain stationary when the valve is opened, the orifice is exposed to view and is accessible. The top seat construction assures positive opening and closing of the value and eliminates seepage or "trickle." The orifice is placed well above the water line where it is free from deposits.

◆

## 213—Automatic Electric Ignition

The Johnson Gas Appliance Co., Cedar Rapids, Iowa, has developed a new automatic electric ignition conversion burner, which does away with the constantly burning pilot light. A flick of the thermostat lights or extinguishes the pilot.



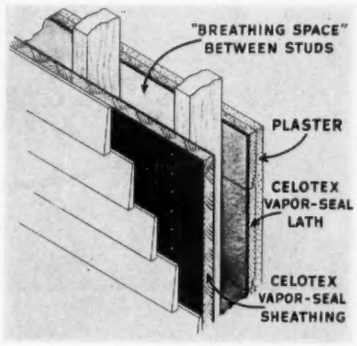
The control equipment is standard Minneapolis-Honeywell, and consists of a T-11A Acratherm and a V-16A Solenoid valve.

The electric ignition is available as an auxiliary unit adaptable for furnaces, conversion burners, floor furnaces, gas ranges and water heaters.

## ● 214—Safety-Sealed Construction

The Celotex Corporation, 919 North Michigan Avenue, Chicago, has developed Safety-Sealed Construction for the outer wall, inner wall, roof and top floor ceiling.

The outer wall is sealed with Celotex Vapor-seal sheathing outside of the

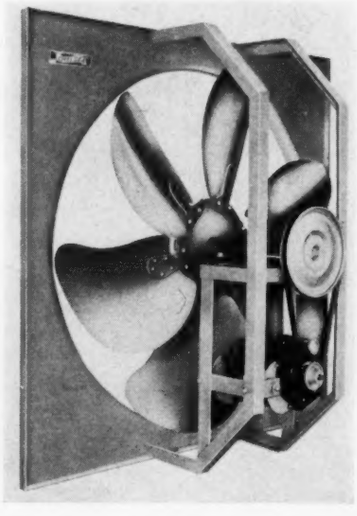



studding and Celotex Vapor-seal lath lines inner walls to form a second seal. Together these two seals furnish insulation and vapor protection. One inch thick Celotex Vapor-seal lath applied on top floor ceilings makes a third seal that reduces outside heat penetration through the roof in summer and the escape of furnace heat in the winter. The last and fourth step seals the roof with Celotex "triple-seal" asphalt roofing.

◆

## 215—Chelsea Industrial Fan

Chelsea Fan & Blower Co., Inc., 370 West 15th St., New York City, announces a new industrial fan of sturdy construction with ball bearings throughout, sizes 24 by 72 in.



Frame is battleship gray, motor black, blade red with chrome trim. Capacities range from 5700 to 18,000 cfm. All are six blade fans except Cat. No. 24DH, which is four blade.

Blades are die stamped and die formed, riveted to die formed steel spider, bolted to heavy cast iron hub.

# "Our heads don't break off and our threads don't strip .. WE'RE GENUINE SHEET METAL SCREWS!"

WHY do thousands of sheet metal shops demand *only* Parker-Kalon Screws? Because, in a nutshell, they have learned from experience that *only the genuine gives genuine results.* That's why it's Parker-Kalon Sheet Metal Screws for them—first, last and always!

Parker-Kalon Screws are uniformly accurate and are threaded full diameter to the head. They go in easily and hold securely every time. And because genuine Parker-Kalon Screws have heads that won't twist off and threads that won't strip, annoying and costly delays, held-up jobs, and extra expense to replace faulty screws are all things of the past.

Read at the right how the unmatched quality of Parker-Kalon Screws, which helps contractors make a better profit on their jobs, is maintained. And insist on *genuine* sheet metal screws . . . insist on *Parker-Kalon* Screws.

PARKER-KALON CORP., 200 Varick Street, New York, N. Y.

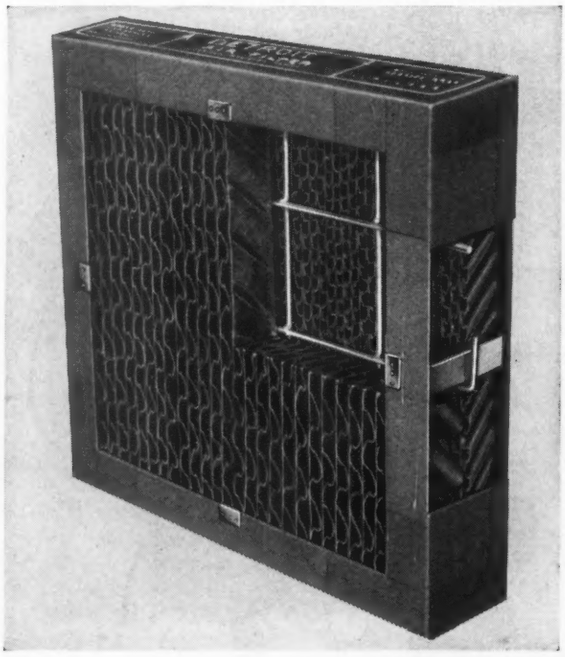
## 4 REASONS WHY YOU CAN DEPEND ON PARKER-KALON SHEET METAL SCREWS

1. **UNEXCELLED LABORATORY FACILITIES** . . . the Parker-Kalon Laboratory which controls and maintains the high standard of quality for which Parker-Kalon Screws are so widely recognized, represents an investment of over $250,000.
2. **SPECIALIZED PRODUCTION EQUIPMENT** . . . is required to produce Parker-Kalon Self-tapping Screws and to maintain their uniformly high quality. The Parker-Kalon plant is famed as the most up-to-the-minute in the industry.
3. **FREE ENGINEERING SERVICE** . . . to help designers and production men obtain better fastenings at lower cost. Available throughout the country, Parker-Kalon Assembly Engineers render free service to both users and prospective users of Parker-Kalon Self-tapping Screws.
4. **AVAILABLE EVERYWHERE** . . . no matter where your plant is located there is a reputable supply house distributing Parker-Kalon Screws . . . assuring you a dependable source of supply.

# PARKER-KALON *Sheet Metal Screws*

SOLD ONLY THROUGH RECOGNIZED DISTRIBUTORS

# MORE SERVICE FROM AIR FILTERS



The Detroit Air Filter (formerly the Arco Filter) is built in such a way that its entire depth is effective in air cleaning and its cleaning efficiency actually increases in service instead of diminishing. • At the same time, its very low initial air resistance increases at a slower rate than filters of other design because the entire filter area remains effective in service—no spot clogging, no disintegration. • The Detroit Filter is easier to handle because it is fully reinforced with metal—it will not sag or break apart. • Extremes in temperature (from zero to 180°) do not interfere with filtering efficiency. • This filter is not an expensive unit—in fact it costs less than many filters of this class and no more than the others, in spite of its greater effectiveness.

***Write for descriptive bulletin***

**DETROIT LUBRICATOR COMPANY**

*General Offices:* DETROIT, MICHIGAN

Canadian Representatives: RAILWAY AND ENGINEERING SPECIALTIES LIMITED

Montreal • Toronto • Winnipeg

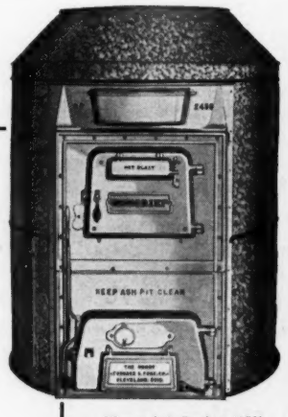
# MONCRIEF

## HAS ALL THE ANSWERS FOR YOU

No matter what your prospect asks for, you have it for him in the complete Moncrief line. There is a furnace and a winter air conditioner of just the type, size and price for any situation. In addition, Moncrief provides a convenient Financing Plan, a dependable Engineering Service and effective advertising literature and sales helps.

Line up with Moncrief and you will be right in line for quick profits and repeat business.

*Write for Circulars*



Moncrief Series "S" Steel Furnace

★

Cast Furnaces

Steel Furnaces

Winter Air Conditioners for Coal, Gas or Oil

Blower-Filter Units

Automatic Humidifiers

Gravity and Air Conditioning Pipe and Fittings

**THE HENRY FURNACE & FOUNDRY CO.**

3473 EAST 49th STREET CLEVELAND, OHIO

# REGULAR ORDERS . . . SPECIAL ORDERS . . . RUSH ORDERS . . .

## *they all get "Scully Service"*

ALLOYS
ANGLES, HOT ROLLED and COLD ROLLED
ARCHES (CORRUGATED)
BABBITT
BANDS and HOOPS
BARS, HOT ROLLED
ALLOYS (HR and CF)
COLD FINISHED
ELECTRIC HIGH CARBON STEEL
REINFORCING
BEAMS and C. B. SECTIONS
BEEF RAIL
BOLTS, NUTS, WASHERS, ALL KINDS
BORING and TURNING BARS and GRINDERS
BRACES, BOILER
CHAIN, ALL KINDS
CHANNELS
CHISELS
CHUCKS, STAYBOLT
CLAMPS, BOILERMAKERS
CLIPS, PATTERSON
CLEANERS, FLUE
CONDUCTOR PIPE
COPPER and BRASS
COUPLINGS, HOSE
CRAYONS, SOAPSTONE
CUTTERS
DARDELET RIVET and MACHINE BOLTS
DRILL RODS
EAVE TROUGH and FITTINGS
EXPANDERS, FLUE
FERRULES, COPPER
FLANGES, BOILER and TANK
FLOOR PLATES
GALVANIZED SHEETS, BARS, BANDS, ETC.
HANDLES, HAMMER
HEADS, TANK and FLANGE
HOISTS, HAND and POWER
IRON, STAYBOLT
LUGS, BOILER, TANK and SILO
MACHINERY, HAND and POWER
MANHEAD PLATES and FITTINGS
NAILS
PACKING
PAINT STICKS
PLATE STEEL, STANDARD QUALITIES
ABRASION RESISTING
COR-TEN and MAN-TEN
PLUGS, FLUE
RAILS and FITTINGS
REAMERS
SHAFTING
SHEETS
ABRASION RESISTING
ELECTRICAL
COR-TEN and MAN-TEN
HOT ROLLED and UNIFORM BLUE
WELLSVILLE POLISHED
COLD ROLLED
STAINLESS STEEL
GALVANIZED and GALVANNEALED
LONG TERNE
CORRUGATED
U-S-S COPPER STEEL
SPRING STEEL BARS and SHEETS
STAINLESS STEEL
STRIP STEEL, CR and HR
TEES
TIRE, ROUND EDGE
TOOLS, HAND and POWER for BOILER and IRON WORK
TROLLEYS
TUBES, BOILER
TURNBUCKLES
VALVES, BLOW-OFF
WELDING ROD and WELDERS
ZEES

USS Scully Service

THE name "Scully" has become a synonym in the steel business for prompt, friendly service. A constantly growing list of customers—today totalling many thousands—has learned that no matter how small or how large an order may be it will always get the same treatment from Scully. Each of our 8 conveniently located warehouses works on the principle that customers want friendly contacts and prompt deliveries. If you're not one of our customers now, "Call Scully" the next time you need steel, steel products, copper or brass. And if you do not have a copy of our handy Stock List and Reference Book, be sure to ask for one—it's free, of course.

"Just a line to let you know how much we appreciate the handling of our above order number. This order was telephoned to your office late yesterday evening and the material was received at our plant about 1:30 P.M. today. Assuring you that this service is very much appreciated and one we will remember, we are . . . "

*When you re-tube boilers—remember Scully*

**SCULLY STEEL PRODUCTS COMPANY**

*Distributors of Steel, Steel Products, Copper and Brass*

*Warehouses at*

CHICAGO · NEWARK, N. J. · ST. LOUIS · BOSTON · ST. PAUL—MINNEAPOLIS
CLEVELAND · PITTSBURGH · BALTIMORE

UNITED STATES STEEL

# Association Activities . .

## Chicago

The Furnace & Sheet Metal Institute met at Rhineland Hall, Southport and Belmont Avenue, on October 26. The Secretaries Conference and their work in forming a national association was reported by John Novak. Two new members were announced.

## South Chicago

The Associated Sheet Metal and Air Conditioning Contractors, Chicago's south side association, meets the 4th Wednesday every month. John Bierma, 11523 Princeton, is president, and A. R. Harris of the A. R. Harris Furnace Company, 4548 Homan Avenue, Hammond, Indiana, is secretary.

At the September 27 meeting, Louis Reining, Howard Mason and Art Meiche were speakers.

## Coming Conventions

**1940**

**Jan. 22-24—National Warm Air Heating and Air Conditioning Assn. Hollenden Hotel, Cleveland. Allen W. Williams, Man. Dir., 5 E. Long St., Cleveland.**

**Feb. 9-10—Sheet Metal and Warm Air Heating Contractors' Association of Indiana, Inc. Annual Convention. Union Building, Purdue University. Paul R. Jordan, Executive Secretary, 631 S. Delaware, Indianapolis, Ind.**

**Feb. 12-14—Master Sheet Metal, Heating, Ventilating and Air Conditioning Contractors Association, Inc., Plankinton House, Milwaukee. Exhibits. Paul L. Bierasch, Secretary, 225 E. Michigan St., Milwaukee.**

# News Items . . . . . .

## New York Trade School

Two hundred sixty-two students enrolled in the sheet metal and pattern drafting evening classes of the New York Trade School this year. All the Union apprentices from the sheet metal workers union in New York and vicinity are required to enroll in the New York Trade School classes, and the New York Trade School has made provisions to take care of the 262 students.

One class, held on Monday, Wednesday and Friday evenings from 7 to 9, is open to mechanics and non-union apprentices. The Tuesday and Thursday evening classes run from 5:30 to 9:30—four hours—and are reserved for union apprentices only. The three-night-a-week class enrolled 70; the Tuesday class 96; and the Thursday class 96, making a total of 262. W. Neubecker is head instructor.

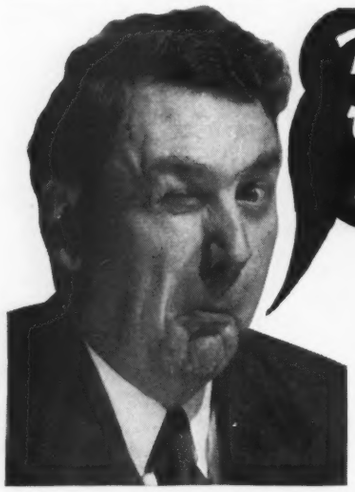
## Obituary

### Henry P. Reuter

Henry P. Reuter, president and founder of Henry P. Reuter & Sons Sheet Metal Works, Kankakee, Illinois, died on October 3 at the age of 83 years. Mr. Reuter had been in the sheet metal business for the past 50 years.

### L. W. Harrington

L. W. Harrington, of the T. New Construction Company, New York, died recently. Mr. Harrington entered the employ of Barnes & New on February 2, 1870, and remained with the firm until his death. Mr. Harrington was a charter member of the United Roofing Contractors Association and at one time served as a member of the Board of Directors.

The HESS Line includes every type of Furnace to fill your requirements

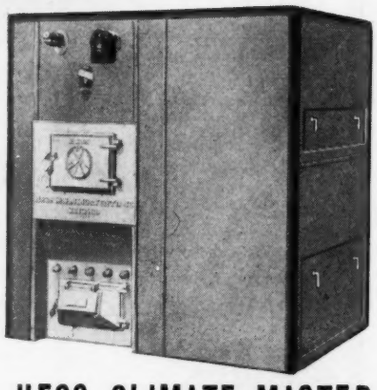
FREE!
1940
Dealer Portfolio
Complete Details
and Sales Helps

The HESS FRANCHISE offers You—

*One reliable source of supply* with a background of 66 years of successful experience. The Hess line is complete, including welded steel furnaces up to one million B. t. u. capacity, blower filter units, oil burners, stokers, all accessories for complete installations. No job is too large or too small for Hess equipment.

*Greater opportunities for sales* because the Hess Furnace is distinctively different with more selling features than ordinary furnaces. It is rectangular throughout . . . not a round furnace with a square casing.

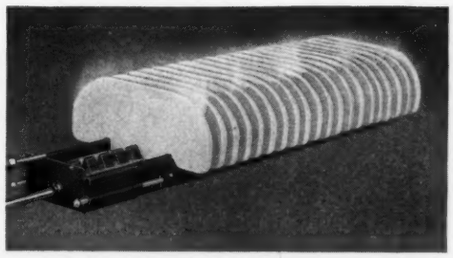
*Real territory protection.* No competition with other dealers in your vicinity selling the same item. Effective advertising materials, attractive consumer literature and successful sales plans, are furnished to Hess Dealers to help them secure prospects and orders.



HESS CLIMATE MASTER

The newest development in progressive designing of Winter Air Conditioning equipment with Summer cooling benefits. Combines the Hess Welded Steel Furnace with Hess Blower and filters within one casing.

HESS WARMING AND VENTILATING CO.
Established 1873
1211-27 S. WESTERN AVE.
CHICAGO, ILL.

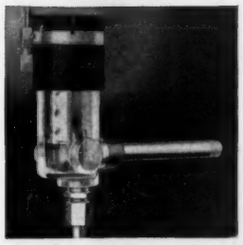


# Why So Many Leading Furnace Manufacturers Specify Monmouth

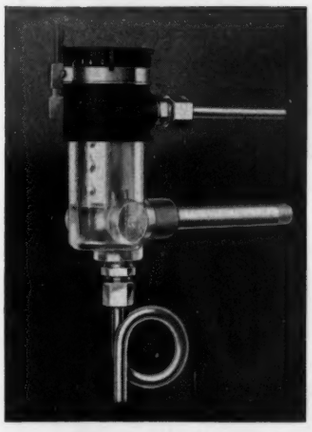
From the *many* reasons we mention four. *First* the plates guarantee ample capacity without taking up excessive space. *Secondly* the lifetime plates are virtually non-clogging and are easily de-limed. *Thirdly* it is the type giving ample capacity without causing condensation in the ducts. *Fourthly* there is a complete range of controls to meet every price requirement.

Why don't you, too, sell *engineered humidity?*

**FLOTROL**—the first genuinely scientific float control ever developed selling at a price that fits most competitive units. Operation is automatic except during very severe weather when hand adjustment is required.



**MICRO-FEED** — a completely automatic feed control for gravity heating systems. Produces automatically graduated humidity regardless of outside temperatures.



**HUMIDIGRAD**—the last word in scientific automatically graduated humidity control. Includes filter and pressure governor.

★ ★ ★

We will welcome the opportunity of sending complete information and prices to any interested manufacturer, jobber, or dealer.

**MONMOUTH PRODUCTS, INC.**
1933 E. 61st., Cleveland, O.

**MONMOUTH**
*The Greatest Name in Humidification*

*Group at the '38 Exposition increasing their ability to serve.*

*Sure, they'll be there!*

THIRTY thousand strong, they'll be at this great exposition. Who? Men who know that their interests demand intimate, up-to-the-minute familiarity with everything that goes into a heating, ventilating or air conditioning installation. Sheet metal men, whether their work is buying or selling . . . planning, designing, installing or servicing . . . . can here see more and learn more about these products than they could anywhere else in such a short time.

More than three hundred exhibitors will display their new products, make demonstrations, answer questions, discuss needs, solve problems.

You are cordially invited. Admission is by registration.

**6th INTERNATIONAL HEATING & VENTILATING EXPOSITION**
*The Air Conditioning Exposition*
LAKESIDE HALL, CLEVELAND, OHIO
JAN. 22-26, 1940
Auspices American Society of Heating & Ventilating Engineers
Management, International Exposition Co.

101

# New Literature . . . .

**For your convenience in obtaining copies of new Literature use the coupon on page 84.**

## 245—Yorkaire Heat Stokers

York Ice Machinery Corporation, York, Pa., is distributing a folder, illustrating and describing their Yorkaire Heat automatic stoker—anthracite or bituminous.

◆

## 246—Damper Control Catalog Pages

Goese Manufacturing Company, 2548 North 18th St., Milwaukee, Wisconsin, is now offering new catalog pages to the jobber, as well as descriptive literature of their solid cold rolled steel damper control.

◆

## 247—"The Gyps May Get You"

Sheridan Iron Works, Inc., Sheridan, Wyo., is distributing a reprint from "Better Homes & Gardens" magazine, entitled "The Gyps May Get You If You Don't Watch Out."

◆

## 248—Booster Fan

Brumme Manufacturing Co., 314 S. Artesian Avenue, Chicago, is distributing an envelope stuffer illustrating and describing their booster fan for the hard-to-heat room, with a 3-speed control unit.

◆

## 249—Niagara Bulletin 80-C

Niagara Machine & Tool Works, 637 Northland Avenue, Buffalo, is distributing Bulletin 80-C, just off the press, which illustrates and describes the latest Niagara foot operated squaring shears and hand operated circle shears.

## 250—Finned Coils for Air Conditioning

Sam Kennard, Inc., 3333 Market Street, St. Louis, is distributing a loose-leaf catalog covering Kennard finned coils for air conditioning—cooling by direct expansion or cold water, and heating by steam or hot water.

◆

## 251—Lau Two-Color Catalog

Lau Blower Company, 954 E. Monument Avenue, Dayton, Ohio, is distributing a new catalog in two colors, featuring changes and improvements in the Lau line of blower assemblies, blower wheels and housings, and including performance data. The 1940 line is expected to include several new products.

◆

## 252—Smoke Ordinances and Regulations

Smoke Prevention Association, Inc., City Hall Square Building, Chicago, has published a "Manual of Ordinances and Requirements in the Interest of Air Pollution, Smoke Elimination and Fuel Combustion." This is the 1939 official publication of the association. There are descriptions of methods of measuring air pollution, and prepared papers read before the 33rd annual convention of the Smoke Prevention Association. Price 50 cents each.

◆

## 253—Electric Tool Care and Maintenance

The Black & Decker Manufacturing Company, Towson, Maryland, recently published a twelve-page booklet—"The Proper Care and Maintenance of Portable Electric Tools"—which gives some very helpful hints, not only on care and maintenance, but also methods of properly grounding to protect the operator, currents, proper sizes of extension cable and pointers on what to look for when a tool fails to operate. The book is a real "pocket pal" for the portable electric tool user.

Sheet metal men everywhere are turning out accurate work, quickly, at lower cost with Niagara Folders and Brakes, and other machines in the complete Niagara Line. Write for Catalog 94.

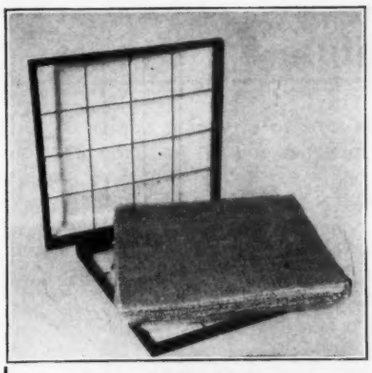
**NIAGARA**

MACHINE & TOOL WORKS

BUFFALO, N. Y.

*Branches:*

New York Cleveland Detroit



# RESEARCH PRODUCTS CORPORATION

## *Re-Fil-Able*

## "WALTON" AIR FILTERS

THIS unusual Air Filter will enable you to give cleaner and more efficient operation to your customers in addition to passing on savings in operation. The Research Products Corporation Re-Fil-Able "Walton" Air Filter which consists of a permanent steel frame with a removable cover and replaceable filter element, once installed in an air conditioning system, will function with the highest degree of efficiency. It also gives you the opportunity to pass on to your customers a saving of approximately one-third of their filter bills, as Research Products Corporation Re-Fil-Able "Walton" Air Filter features save that much in the course of time . . . and assure you of a great volume of repeat refill business at the same time. Research Products Corporation Re-Fil-Able "Walton" Air Filters are the filters that last . . . that remove the dust . . . do not hamper air flow, and in general increase the efficiency of any air conditioning system. Line up with Research Products Corporation Re-Fil-Able "Walton" Air Filters Now . . . Write for full information at once.

## RESEARCH PRODUCTS CORPORATION

MADISON WISCONSIN • Manufacturers of - -

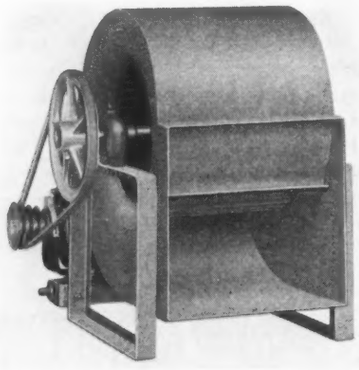
- **R-P ZEOLITE** — High capacity, long lasting, low cost mineral for softening water.
- **FILTERAG** — An efficient filter medium for filtering water and liquids.
- **ALKALEX** — A carbonaceous cationic exchanger for removing alkalinity from water.
- **BIRM** — The effective, inexpensive mineral for removing iron from water.
- **AIR-FILTERS** — Made of expanded fibre, high dirt removal efficiency, low resistance to air flow.

---

# *Clip the coupon for your copy—*

of the NEW DATA SHEET for

# REX BLOWERS



Ratings for each unit taken from individual tests made by an impartial engineering laboratory

MANUFACTURERS of air conditioning units will find the *REDESIGNED* REX Blowers, offering as they do a number of sizes in both the A. C. and H. P. series, readily adaptable to their requirements for ample volume and dependable operation within small space requirements.

DEALERS who use blowers for air conditioning, forced air heating or ventilation with duct systems will also find that REX Blowers are admirably suited to their needs.

REX BLOWERS are furnished with motors top or rear mounted or without motors. Also described in this new folder are WHEELS, HOUSINGS AND BEARINGS of superior design.

Air CONTROLS INC.

Div. of
The Cleveland Heater Co.
1933 W. 114th St. Cleveland, Ohio

FIRM .....

INDIVIDUAL .....

STREET .....

CITY .....

DEALER..... .....MANUFACTURER.....JOBBER.....
AA 11-39


# New Literature . . . .

**For your convenience in obtaining copies of new Literature use the coupon on page 84.**

## 254—Modernize Your Shop for 1940

The Lockformer Co., 4630 W. Flournoy Street, Chicago, is distributing a folder entitled "Modernize Your Shop for 1940." Lockformers, the work they produce, the power flanger and the easy edger are pictured.

◆

## 255—Lead for Metal Workers' Use

Eagle-Picher Lead Company, Temple Bar Building, Cincinnati, Ohio, is distributing a 36-page catalog covering Eagle metallic products—sheet lead, flashing, roof flanges, solders, flux, tin sheet, red lead in oil and white lead in oil.

◆

## 256—Type RB Single-Phase Motor

General Electric Co., Schenectady, N. Y., is distributing Leaflet GEA-98B covering their Type RB motor, single-phase, repulsion, brush-shifting motor—¼ to 3 horsepower—110/120 volts, 60 cycles. Characteristics are included.

◆

## 257—AireOzonet

The AireOzone Corporation, 105 West Madison Street, Chicago, is distributing a folder covering the AireOzonet Model 51 for the small home—an automatic oil-burning furnace, delivering 65,000 Btu at the bonnet. Revised specifications are given.

◆

## 258—Rybolt Dealer Helps

The Rybolt Heater Co., Ashland, Ohio, is distributing a sheet of five newspaper advertisements prepared to help dealers with their local advertising. Mats or electros are available, as needed by the local newspaper, with space left for the dealer's name and address. Two are 1-column ads and three are two-column ads.

◆

## 259—Gas Fired Conditioners

Bastian-Morley Co., Inc., LaPorte, Indiana, is distributing the Bulletin of The Producers' Council—No. 32—covering Basmor gas-fired warm air conditioners in three types and 8 capacities—46,800, 90,000, 129,600, 172,800, 216,000 and 259,200 Btu output at the register. Basmor warm air conditioners are distributed nationally by Crane Co.

◆

## 260—International Heater Price Sheet

International Heater Company, Utica, N. Y., is distributing a new price sheet, effective October 11, 1939, reflecting higher prices on International Warm Air Furnaces and Air Conditioning Units. A 30-in. firepot furnace, known as Number 30P. has been added to the Economy Blue Front Line.

◆

## 261—Humidaire Independent of Heating Plant

American Humidaire Corp., Grand Rapids, Michigan, is distributing a folder covering their Humidaire, gas fired, with a capacity of 15 gallons of water evaporated every 24 hours. Size 21 in. high, by 14 in. wide by 9¼ in. deep.

This automatically controlled humidifier is suspended between floor joists in basement directly below a 6 x 8 in. floor grille. For warm air furnace, the Humidaire unit is installed on the side of the furnace. A copper pipe connection conducts the water vapor into the bonnet or plenum chamber of the furnace.

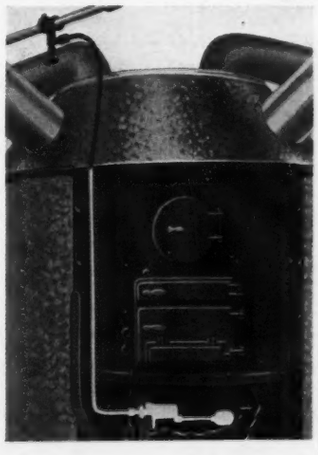
The Humidaire humidifier automatically maintains humidity conditions, entirely independent of the operation of the existing heating system.

# EASY SALE ... EASY JOB with help from M-VB

Think of this sales mover: in one small box is a complete system to protect your customer's health — and pocketbook.

M-VB humidification provides healthful moisture by keeping the water pan full to the right level on any warm-air furnace. Proper humidification requires less heat . . . saves on fuel.

*All the necessary parts are in the box. Install them in thirty minutes, and without dropping the fire!* Complete stocks maintained at Sturgis, Michigan; Waterville, Connecticut; and San Francisco, California.



Write for *your supply* of free descriptive booklets that will help you sell this finely-built M-VB money-maker!

SCOVILL
*Masters of Metal*

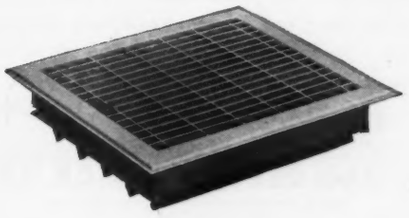
**M-VB**

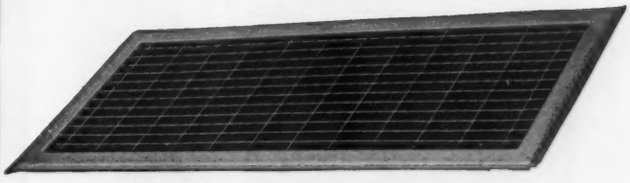
**MORENCY-VAN BUREN DIVISION**
**SCOVILL MANUFACTURING CO.**

***A Complete Line of Closet Tank Fittings***

*Surplus Strength and Simple Beauty in*

# DURABILT
## Floor Registers and Cold Air Faces





A register of fine appearance and extra sturdy construction, the DuraBilt is one of the most popular numbers in the entire Auer Line. Inbuilt strength results from amply heavy materials and rigid *crossbar* assembly, the bars which form the faces being mortised and locked at every cross-joint and also securely interlocked to frame. Frame is welded and reinforced at corners and the finished product is an example of sound and durable workmanship, with close fitting joints that will not pull apart. Bar assembly is tight and true, and faces are level.

The DuraBilt is furnished in a complete range of sizes and finishes for both register and intake use, in standard mesh or if preferred in narrow mesh. Where strength counts, as well as trim appearance—try these splendid DuraBilt Registers! We know you will be more than pleased with them.

▶ *Auer Register Book No. 39, listing and illustrating Auer's complete line of attractive registers and faces for all warm air heating and air conditioning uses, promptly mailed to you on request.*

THE AUER REGISTER COMPANY
3608 Payne Avenue — Cleveland, Ohio

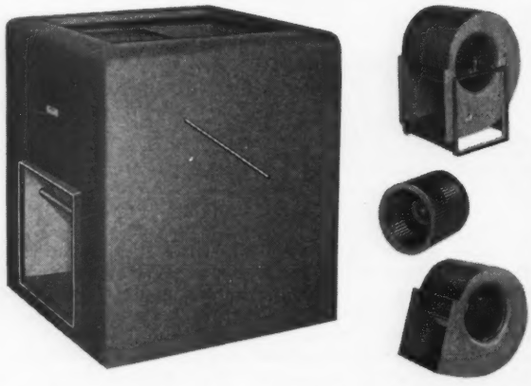
# AUER REGISTERS & GRILLES
## For Air Conditioning *and* Gravity

# FOR YOUR 1940 NEEDS

# CHECK WITH USAIRCO

**New Values have been created for you and your business — Values that can contribute strong sales and performance features to your work and your merchandise. USAIRCO wants you to review its line — compare its values with the market. Over 17 years of engineering and manufacturing progress have gone into the development of present USAIRCO products.**

## USAIRCO BLOWER FILTER UNITS



**Outstanding in their simplicity of engineering—quiet operation—sturdy, compact design—rugged construction—they team perfectly with well designed systems. USAIRCO Blower Filter Units are complete with blower, drive, filters, G. E. motors, M-H furnacestat.**

**USAIRCO also offers a wide selection of Double Inlet Blower Assemblies, with or without drive and motor — also Blower Wheels and Scroll Housings.**

## GET THE USAIRCO LINEUP FOR 1940

**United States Air Conditioning Corp.**
**Northwestern Terminal**
**Minneapolis, Minnesota**

If you have a bigger value at a better price, we want all the details. Send us complete information.

☐ Blower-Filter Package Units ☐ Furnace-Blower Assemblies
☐ Wheels and Scroll Housings

Name_____

Address_____

Town_____ State_____


# New Literature . . . .

**For your convenience in obtaining copies of new literature, use the coupon on this page.**

### 262—Petro Oil Burning Equipment

Petroleum Heat & Power Company, Stamford, Connecticut, is distributing a new catalog covering Petrol oil burners and oil burning equipment. Section 1 is devoted to domestic and industrial oil burners. Section 2 covers automatic oil fired boilers, automatic water heaters, automatic oil fired high pressure boilers, and Petro air conditioning furnaces in three sizes—100,000, 125,000 and 200,000 Btu per hour. Petro pre-cast combustion chambers are also shown.

FOR YOUR CONVENIENCE

American Artisan, 6 N. Michigan Ave., Chicago, Ill.

Please ask the manufacturer to send me more information about the equipment mentioned under the following reference numbers in "New Products" and "New Literature." (Circle numbers in which you are interested):

| | | | | | | |
|---|---|---|---|---|---|---|
| 199 | 200 | 201 | 202 | 203 | 204 | 205 |
| 206 | 207 | 208 | 209 | 210 | 211 | 212 |
| 213 | 214 | 215 | | | | |
| 245 | 246 | 247 | 248 | 249 | 250 | 251 |
| 252 | 253 | 254 | 255 | 256 | 257 | 258 |
| 259 | 260 | 261 | 262 | | | |

Name ..... Title .....

Company .....

Address .....

Are you Manufacturer——Jobber——Dealer——

# With the Manufacturers . . .

### R. T. Lauderbach in New England

Air Conditioners, Inc., distributors of Gar Wood heating and air conditioning equipment, announces the appointment of R. T. Lauderbach in charge of dealer operations for the New England territory.

◆

### Republic Director of Advertising

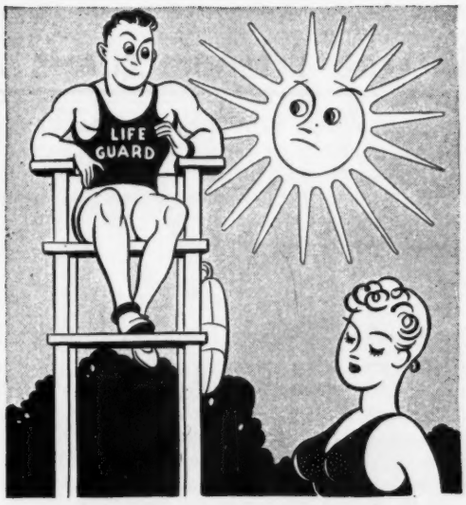
N. J. Clarke, vice president in charge of sales, Republic Steel Corporation, Republic Building, Cleveland, Ohio, announces the appointment of Chester W. Ruth as director of advertising, and Harold H. Oldham as assistant director of advertising. Mr. Ruth succeeds Stanley A. Knisley who recently resigned to become executive vice president of Associated Business Papers, Inc. Mr. Oldham succeeds Mr. Ruth as assistant director.

◆

### Enters Coil Industry

American Coils, Inc., 25-27 Lexington Street, Newark, N. J., announces their entry into the refrigeration and air-conditioning coil industry. The plant is under the supervision of C. A. Sewell. The sales department is under the supervision of Jack Riordan. The air conditioning department is in charge of T. J. Charles.

The plant is equipped to manufacture all types of coils and auxiliary equipment for the refrigeration and air conditioning industry. A laboratory has been installed for development and research.




# STRENGTH AT HIGH TEMPERATURES

Air conditioning and heating plant controls are frequently subject to high temperatures. In order to give the service for which such controls are intended, they must be able to withstand high temperatures; there must be no hesitancy in action under adverse conditions, no variation in movement, otherwise the whole system may be upset. Fuel is then wasted, the heating plant suffers, and the owner becomes dissatisfied.

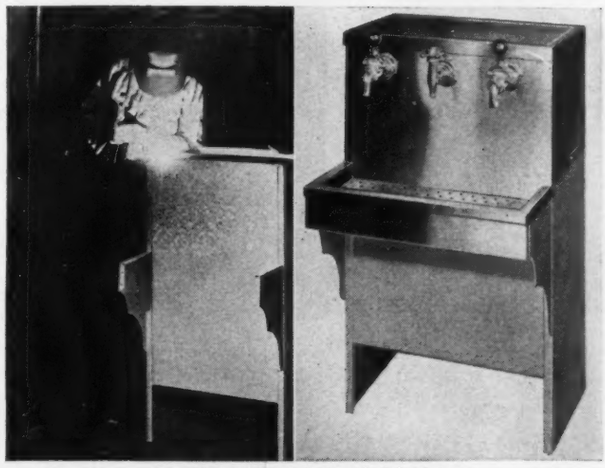
Air conditioning and heating engineers, for the protection of their own reputation, should make certain that there is nothing about the control element of the system about to be installed that, in time, or at high temperatures, may slip or leak and thereby cause a shifting in mechanical movement as originally set. Your reputation and the future success of your business depend on the reliability of the systems you install.

Chace High-Temperature Thermostatic Bimetals are engineered to operate mechanical controls; these bimetals are made to operate under the most severe conditions; there is nothing about them to leak or weaken. Chace High-Temperature Bimetal in a control is your assurance of uniform, dependable, care-free, automatic action, because Chace Bimetal has that *extra strength* so essential to satisfactory control results when operating at *high temperatures.*

*Control manufacturers are invited to consult us regarding the type of Chace Thermostatic Bimetal best suited to meet specific demands.*

**W. M. CHACE CO.**
*1601 Beard Ave.,* **DETROIT, MICHIGAN**

# "OUR PRODUCTS ARE BETTER, OUR PRODUCTION IS FASTER, OUR COSTS ARE LOWER"



*Arc welding stainless steel cabinet for Schmidt beer drawing equipment. Inset shows complete product.*

● Mr. Franklin Schmidt, Pres., Schmidt Sheet Metal Works, Buffalo, N. Y. says, "Electric arc welding has enabled us to improve our beer drawing equipment, doughnut kettles and other stainless steel, galvanized steel and black iron products, resulting in greater sales. It has speeded up production, enabling us to handle increased volume with equal plant capacity. It has also materially reduced our manufacturing costs. We are enthusiastic about Lincoln welding equipment and service."

Have you investigated the profit possibilities of arc welding as applied to *your* problems? Call the nearest Lincoln office today or mail the coupon. No obligation. THE LINCOLN ELECTRIC CO., CLEVELAND, O. Largest Manufacturers of Arc Welding Equipment in the World.

**NEW** *"Shield-Arc Junior"* Welder with Self-Indicating "Job Selector" and Current Control. Provides the right TYPE and INTENSITY of arc for lowest cost on every Job.

**THE LINCOLN ELECTRIC CO.**
**Dept. EE-636, Cleveland, Ohio.**
Send free information on sheet metal welding with bulletin on new *"Shield-Arc Junior"*

Name _____ Position _____

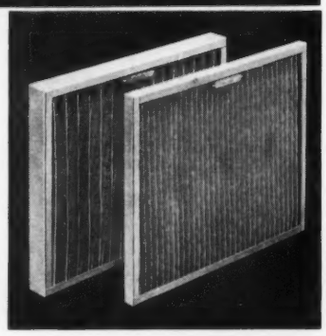
Company _____

Address _____

City _____ State _____

**SAFEGUARD**
*The Performance of Your Unit*

**AIR-MAZE**
*Kleenflo*
**Filter Panels**
*for*
*Air Conditioning and Ventilating Systems*



**Cleanable • Need No Replacement • Efficient**
**Low Priced • Fire Retardant**

When performance is unsatisfactory, frequently the air conditioning unit is blamed when the real trouble is a clogged, inefficient air filter which needs replacement.

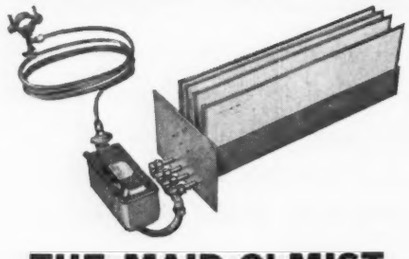
The new KLEENFLO Air Filter panels need no replacement. They are designed, built and tested to give 98% to 99.6% efficiency with extremely low pressure drop. Cleaning and "charging," required only after long intervals, cost only a few cents. After servicing, KLEENFLO Panels are again like new, ready for top-notch performance. Of all-metal construction, KLEENFLO Panels are sturdy, dependable and *fire retardant*. APPROVED BY THE UNDERWRITERS LABORATORIES.

*Write for Bulletin KCP-118 and prices.*

**AIR-MAZE CORPORATION, 5130 HARVARD AVE., CLEVELAND, OHIO**

**AIR-MAZE**

*Setting a NEW HIGH in*
**Humidifier Efficiency**



**THE MAID-O'-MIST**
**"CONVECTOR"**

For forced or gravity circulation. Offers continuous quick evaporating even at low temperature. Consists of two or four copper troughs 1/4" wide and spaced 1" apart. Patented metal-edged, replaceable evaporators six inches high are of special absorbent material and corrugated. Troughs are mounted securely on a flat hood plate 5" wide x 8" high which fastens on the plenum chamber wall with metal screws. Rear end of humidifier is supported by a truss brace which extends to the top of the front plate. Water Feeder is of brass, copper and Monel metal, with all parts, including copper float, nickel plated. Convector Humidifier is available in eight sizes. The smallest size has evaporating capacity of 25 lbs. of water per day at 130°. The largest size has a maximum evaporating capacity of 225 lbs. per day at 230° on gravity circulation.

*Send Today for CATALOG A-11 with Specifications and Prices.*

**MAID-O'-MIST, Inc.**
180 N. Wacker Drive, Chicago, Ill.


# With the Manufacturers . . .

## Duff Viking Production Manager

Viking Air Conditioning Corp., Main and Center Streets, N. W., Cleveland, Ohio, announces the appointment of Forrest L. Duff as production manager. Mr. Duff will have charge of production and will also assist Arthur Bennekamper, plant manager.

◆

## Cheney-Royal Pipe Covering Protectors

Grant V. Wilson, president, Grant Wilson, Incorporated, 4101 West Taylor Street, Chicago, has been appointed exclusive distributor for Cheney-Royal pipe covering protectors in the states of Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, the Dakotas, Missouri, Nebraska, Ohio and Wisconsin. A complete stock of all popular sizes is carried in Chicago.

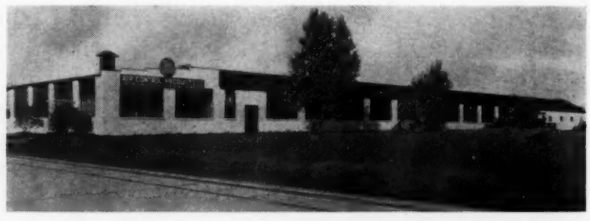
A circular and approved contractors price sheet No. 1101 are available.

◆

## Air Control Products Plant

Air Control Products, Inc., Muskegon, Mich., organized late last year now occupies this new plant.

The company manufactures registers designed for warm



air heating and summer cooling. The registers are adjustable four ways, up and down, left and right, making possible any direction of air flow. Adjustment may be made after installation. A catalog is available.

◆

## Portland Store Purchases Patterns

Upon the retirement from active business and manufacturing operations, of the Wood and Bishop Company of Bangor, Maine, and their associated company, the Noyes and Nutter Manufacturing Company of Bangor, Portland Stove Foundry Co., Portland, Maine, purchased many of their patterns and will continue production.

Franklin Lawrence is president.

The company secured their Franklin stoves, box stoves, wood burning cook stoves, several of their more modern range patterns, and a general assortment of patterns for the common repairs to their entire line.

The Wood and Bishop Company are closing up their affairs after one hundred years of successful business.

## Brown Wins Vermilye Medal

The Franklin Institute of the State of Pennsylvania will make its first award of the Vermilye Medal "in recognition of outstanding contribution in the field of industrial management," to Lewis H. Brown, President of the Johns-Manville Corporation, New York. This was announced October 30, 1939, by Philip C. Staples, President of The Franklin Institute.

Named after its donor, William M. Vermilye, Vice President of The National City Bank of New York, the medal is purposed to stimulate, encourage and recognize outstanding contributions in the field of industrial management not only in the United States but in other countries as well. Mr. Brown will receive the medal for "his brilliant work in executive management, in industry."

# Randall

## A NAME FOR PILLOW BLOCK EFFICIENCY

Randall Universal Pillow Block

Randall Standard Pillow Block

Randall One-Piece Steel Housing Pillow Block showing vibration-isolating rubber grommets.

Randall's efficient pillow blocks meet the most exacting engineering requirements. Their long life and continuous satisfactory operation in the field demonstrate Randall's carefully engineered design and precision workmanship.

Their unique patented design is simple. They are rugged and dependable. Requiring but a minimum of attention over long periods due to their unusually large oil capacity, they are self-aligning, self-lubricating, and operate with a minimum running torque. They are quiet in operation.

Randall's experience and unsurpassed performance have influenced most manufacturers of heating and air conditioning equipment to standardize on Randall units.

Write for catalog describing in detail the complete Randall line.

**Representatives carrying stocks.**

Tek Bearing Co.
177 Lafayette
New York City

American Stock Gear Co.
100 St. Clair Ave., N. W.
Cleveland, Ohio

Salt Lake Hardware Co.
Salt Lake City, Utah

C. W. Marwedel
San Francisco, Cal.

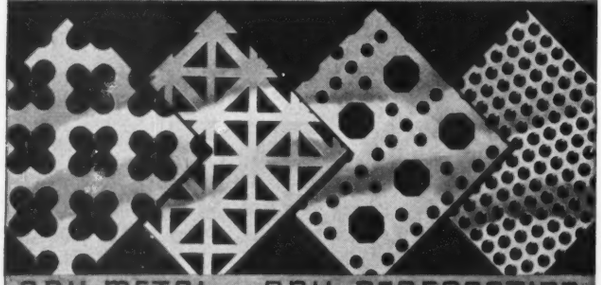
**Randall GRAPHITE PRODUCTS CORP.**
Dept. 1111 609 W. Lake St., Chicago, Ill.

IF your sheet metal work demands the use of trimming dies, then your problem is similar to that of a manufacturer of automobile bodies. Pictured here are No. 16 Unishears in action, where they have greatly reduced the number of costly trimming dies necessary.

UNISHEAR goes right to the job . . . cuts as fast as you feed, without distortion of metal. Follows any line – straight, curve or angle. Leaves smooth, finished edges. No. 16 has a capacity of 16 gauge hot rolled steel. Handles material as fast as you can feed it, at 2400 shear cuts per minute. Other portable Unishears with capacities of 18 and 12 gauge hot rolled steel; stationary models that cut up to ¼" boiler plate. Ask your dealer for a demonstration or write for Catalog. Stanley Electric Tool Division, The Stanley Works, 131 Elm St., New Britain, Conn.

**STANLEY UNISHEARS**
THE ELECTRICALLY DRIVEN HAND SHEARS

PERFORATED METALS
Industrial and Ornamental



ANY METAL • ANY PERFORATION

Industrial Perforations include all sizes of round, oblong, and many special shaped perforations, for Screening, Grading, Draining and Guarding purposes. Our line is very complete.

Ornamental Perforations are used in Architectural Grilles, Radiator Enclosures, Metal Furniture, Cabinets, Stoves, etc. In addition to the standard shapes we have many exclusive and attractive designs suitable for different uses.

H&K workmanship is unsurpassed.

Write for prices and other information.

The Harrington & King PERFORATING Co.

5649 Fillmore St., Chicago, Ill. New York Office, 114 Liberty St.

REPAIR PARTS
TO FIT ANY STOVE OR FURNACE

The stock of repair parts at Peninsular is the last word in quality and accuracy. Parts to fit any Furnace, Boiler, Stove or Air Conditioning equipment can be supplied at a moment's notice.

Why not order your next repair part from Peninsular? You'll be surprised at the speed and efficient service you receive.

Write us today for catalog.

PENINSULAR
STOVE COMPANY
2699 Gratiot Ave. Detroit, Mich.

## Batten Type Copper Roof

(*Continued from page* 60)

together to form the true ball. The cupola pieces ready for seaming were made up in the shop and shipped to the job.

The gutters shown in the pictures are box type on wood framing with a girth from the back apron seam to the front drip of about 23 inches. The loose locks in the back apron permit longitudinal movement of the copper. There are no expansion joints used between gutter outlets.

The interesting weather vane, depicting a river stern-wheeler under full steam was designed as a full scale model by the architect. From the model Smither workmen reproduced the vane in 24-ounce copper forming two sides with edges. The sides are held apart by ⅛ by ⅜-inch brass bars on which the two halves are assembled. The weather-vane turns on phospher-bronze bearings on the pole (carries the compass points) which was erected by others.

The architect for the building was Jens Fredrick Larson, Hanover, New Hampshire.

◆

## Columbus, Ohio Licensing Code

(*Continued from page* 68)

violates or fails to comply with any such provisions of this ordinance shall be deemed a separate offense.

### Constitutionality

Section 21. Should any section, clause or provision of this ordinance be held unconstitutional or invalid by any court, all other sections, clauses and provisions shall nevertheless be deemed as effective as though such unconstitutional or invalid section, clause or provision had never been inserted in this ordinance.

Section 22. That this ordinance shall take effect and be in force from and after the earliest period allowed by law.

Passed June 12, 1939.

WYATT L. MILLIKIN,
President of Council.

Approved June 12, 1939.

MYRON B. GESSAMAN, Mayor.
Attest: HELEN T. HOWARD, City Clerk.

◆

## Arnold Kruckman's Washington Letter

(*Continued from page* 63)

about various forms of advertising. It has the facilities to analyze credit and collection problems, banking problems, where and how to borrow money. If it is not able to provide the answer directly, it secures the reply from the most competent source, sometimes even cabling or telephoning to the American embassies abroad.

## There You Are, Lady!

My . . . you're a smart man! This won't be a "Cold Room" anymore!
FLOOR MODEL
Contractor's Cost Only $6.00
WALL MODEL
Contractor's Cost Only $8.65

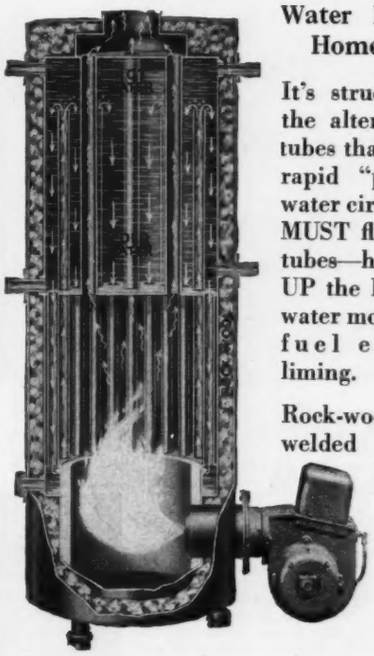
In just 3 minutes you can cure a "cold room" forever. A powerful Victor Heat Booster pulls out the cold air "cork" and brings the heat up fast. Installed at the register and connected to nearest electric outlet it is the easiest, quickest and most satisfying way to meet "cold room" complaints. Ask your Jobber or write for attractive dealer discounts and special profit boosting sales plan. Write today!

VICTOR ELECTRIC PRODUCTS, Inc.
3048 Robertson Ave., Cincinnati, O.

# VICTOR
## HEAT BOOSTERS

---

# *Really New*—The Aldrich "Heat-Pak" Oil Fired



**Water Heater and Small Home Heating Boiler**

It's structurally NEW—note the alternate short and long tubes that cause a much more rapid "percolator" type of water circulation. Cold water MUST flow DOWN the short tubes—hot water MUST flow UP the long tubes. ALL the water moves FASTER. Means fuel economy—prevents liming.

Rock-wool insulation; arc-welded thruout; galvanized or non-galv.; has ALDRICH oil-burner; 80% over-all efficiency; uses low-cost No. 3 oil; made for 125, 175, 300 and 500 g.p.h. Shipped as a package unit. Does a REAL job—will make you money—write for details.

Aldrich Company, Peoria, Ill.

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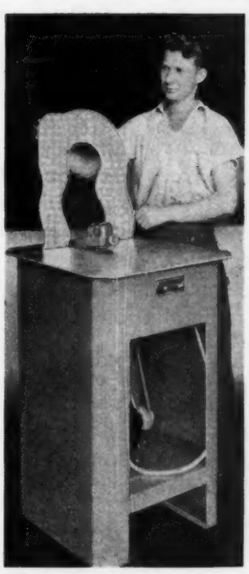
# POWER FLANGER
## By Lockformer



1. For 18 gauge metal and lighter.
2. No starting flange required. Simply feed the flat piece in to the rolls.
3. SELF GAUGING. No height-gauge to set.
4. Flanges any radius from 1¾" up.
5. Large table to accommodate big pieces.
6. Metal lies flat on table.
7. Easy and simple to operate. Any one can turn perfect, uniform edge on it.
8. GUARANTEED IN WRITING.

The flanger of greatest utility for the heating and ventilating contractor—priced on LOCKFORMER precision production basis, F. O. B. Chicago .....$135.00

Other LOCKFORMER products for better shop-profits: LOCKFORMER 22 . . . LOCKFORMER 18 . . . EASY EDGER.

For complete information, details and specifications see your supply dealer or write

THE LOCKFORMER CO.
4632 W. Flournoy Street Chicago, Illinois

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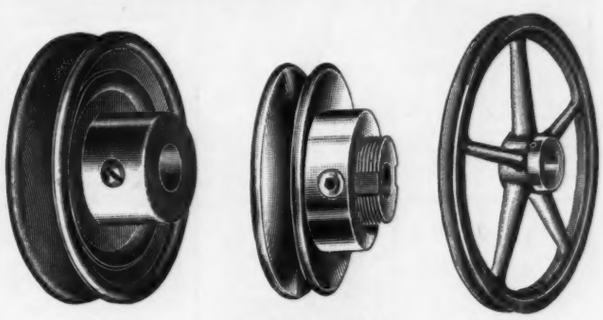
# For Lasting Dependability Install MAUREY V-PULLEYS



STEEL VARIABLE PITCH CAST IRON

Users of V-pulleys quickly discover that they save time and money in Blower, Fan, Stoker, and Air Conditioning installations by using MAUREY Pulleys.

MAUREY V-PULLEYS are designed and built to give the maximum of trouble-free service with F. H. P. motors. They are unusually sturdy, well-balanced and true running. That is why so many users of MAUREY PULLEYS install them year after year. They know that "call-backs" and frequent adjustments due to pulley failures are unnecessary with MAUREY V-PULLEYS.

Write us about your F. H. P. transmission problems. There is a MAUREY V-PULLEY to fit every need. **Ask for Circulars giving descriptions and prices.**

**MAUREY MANUFACTURING CORP.**
**Wabash at 29th, Chicago, Illinois**

"HAVE CLARAGE MAKE THEM"

Every year we ship to furnace manufacturers and to builders of unit air conditioners thousands upon thousands of Clarage Blower Wheels and Assemblies. These smaller units were designed with the same skill characteristic of the larger Clarage equipment — just as carefully constructed — just as carefully tested. And we have sizes to meet ALL REQUIREMENTS — with slow speed operation insuring SILENT PERFORMANCE. May we have your next inquiry?

SPECIFY CLARAGE for
COMPLETE AIR CONDITIONING
VENTILATION
HEATING
COOLING
MECHANICAL DRAFT
FANS & BLOWERS FOR INDUSTRIAL NEEDS

CLARAGE FAN COMPANY • Kalamazoo, Mich.
SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES

WHITNEY LEVER PUNCHES

No. 4B PUNCH

Length—8½ inches. Capacity ⅛-inch through 16 gauge. Deep Throat—2 inches. Weight—3 pounds. Punches and Dies—$\frac{1}{16}$" to $\frac{1}{8}$" by 64ths.

No. 6 PUNCH

Length—26½ inches. Capacity — ¼-inch hole through $\frac{1}{16}$-inch iron; especially adapted for button punching or templet work. Punches and dies ⅛" to $\frac{1}{8}$" by 32nds.

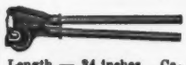
No. 91 PUNCH

Capacity — $\frac{9}{16}$-inch hole through ¼-inch, 1-inch hole through $\frac{1}{16}$-inch and 2-inch hole through ¼-inch iron. Depth throat 5 inches. Weight—82 lbs.

*We have tools for every purpose needed by Sheet Metal Contractors.*

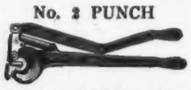
*Ask your Jobber*

No. 1 PUNCH



Length — 3¼ inches. Capacity — $\frac{1}{16}$-inch hole through ¼-inch iron. Punches and dies in sizes from ⅛ to $\frac{1}{16}$ by 64ths.

No. 2 PUNCH



Length — 23 inches. Capacity — $\frac{1}{16}$-inch hole through ¼-inch iron. Punches and dies in sizes $\frac{1}{16}$-inch to ½-inch by 64ths.

CHANNEL IRON PUNCH

Companion to No. 2 Punch. Every part of the two Punches Interchangeable, including punches and dies. Capacity—¼-inch hole through ¼-inch iron.

W.A. WHITNEY MFG. CO.
636 RACE ST. ROCKFORD, ILL.

# Anthracite Stokers

(*Continued from page* 35)

able a number of modern stoker-furnaces designed especially for the purpose. These units are constructed with a large amount of secondary surface, and in some cases with built-in baffles for improving the efficiency of the furnace side walls.

### Controls

A thermostatic control is vital to the proper functioning of any automatic burner. Compared to the small cost involved, the part played by a room thermostat is immense. Reliable limit switches should also be included in any layout.

The "hold-fire" control has also become standard equipment. The function of these devices is to maintain combustion during long periods of shutdown, such as during mild weather and also to keep the fire in good condition at all times so that the response to demands for heat will be immediate.

### Coal Bins

The construction of coal bins is a subject calling for more discussion than is possible here. The size and type of bin most desirable varies with individual conditions. In many cases, sloping bottoms are desirable; in others the additional storage space available in flat bottom bins is considered an advantage. Of paramount importance in any installation, however, is the proper design of the bin outlet for the coal conveyor. First of all, it must be so located that the conveyor will remove a maximum of the bin's contents. It must be easily accessible for the removal of foreign material or oversize coal. It must be located so that water will drain away from it. More complete information on the subject of coal bin construction has recently been released by Anthracite Industries, Inc. (Bulletin M-3.)

### Ashpits

The construction of pits for use with gravity ash removal stokers does not differ from that for pits under hand-fired installations (Anthracite Industries Bulletin MA-1 and M-2). Concrete is the most common type of construction, being waterproofed where necessary. In some cases standardization has been perfected by installation agencies to the point that prefabricated steel or even concrete are used.

The pitting of warm air furnaces presents problems not encountered with other types of heaters. Nevertheless, there is usually a solution not involving any appreciable additional expense. Obviously, the ashpit unit must be sealed off completely from the cold air return.

### Electrical Connections

In making electrical connections to the stoker it is advisable to ground both the motor frame and stoker castings. This will reduce the possibility

# THERMO-DRIP *is the Humidifier with 3 kinds of* DEPENDABILITY

**DEPENDABLE EVAPORATION**

Thin, uncoated stainless steel pan cannot be beat for quick heat transfer. Even at low bonnet temperatures, there's no lag in evaporation.

**DEPENDABLE PERFORMANCE**

Drip feed direct to hot pan surface gives almost "flash boiler" vaporizing action and heat-controlled feed governs amount of evaporation.

**DEPENDABLE PROFIT-MAKER**

Stainless steel construction, absence of mechanical parts, attention-free operation and amazingly low cost gives it "buy appeal."

*Write for Complete Particulars*

**AUTOMATIC HUMIDIFIER CO.**

**18th and Main Streets** **CEDAR FALLS, IOWA**

**THERMO-DRIP**
*Automatic* **HUMIDIFIER**

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## HAVING TROUBLE? —TRY THARCO

The modern Warm Air Furnace would hardly be the splendid heating unit it is if it were not for the furnace cement. That's where Tharco fits into the picture. Compounded of the finest materials obtainable, Tharco is a superior furnace cement in every respect. It's used and approved by the country's leading furnace manufacturers and repair men.

*Write for a free sample can of Tharco.*

MANUFACTURED ONLY BY
**THE ARMSTRONG COMPANY**
DETROIT DALLAS CHICAGO

*Outstanding products for over 25 years*

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# GENERAL CONTROLS
## SINGLE SEATED VALVE

JUST RIGHT FOR CONTROLLING WATER • AIR • GAS • LIGHT OIL

★ Wide range of domestic and industrial use as water valve.

★ Standard two-wire, current-failure valve, free of AC hum.

★ Standard port sizes: $\frac{3}{32}$" and ¼". Maximum operating pressure: 125 lbs. per sq. in. $\frac{21}{32}$" port.

★ Provides on and off control; normally closed. Metal-to-metal seat.

***Write for Catalog today.***

**GENERAL CONTROLS**

**450 East Ohio Street, Chicago, Ill.** **267 Fifth Avenue, New York City**

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# Every ALLEN Installation Sells Another

Every installation of Allen Ventilators means a satisfied customer and repeat sales, because this ventilator gives such outstanding value.

*Three Types—*

**1.** Allen Coni-Vane Turbine, wind operated,—powerful suction without operating cost.

**2.** Allen "Electro Wind," combining motor and air power for jobs requiring double action.

**3.** Allen Type C (without Multi-Vanes) for installations requiring inexpensive equipment, and chimney jobs.

Illustrated, Coni-Vane

You supply stacks and ducts, in addition to installing ventilator. We do not compete with the sheet metal contractor, but cooperate with you closely.
Free engineering service for your assistance.
If you haven't the Allen literature, let us send it for your files.

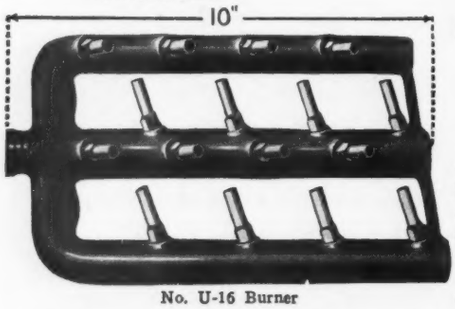
**The ALLEN Corporation**

**9752 ERWIN AVENUE** **DETROIT, MICH.**

# BARBER BURNERS

*For ALL Gas Appliances*

No. S-15 Burner




No. U-16 Burner

Give Your Appliance the Sales Advantage of BARBER Burner Equipment!

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Efficiency! Economy! Performance!

on Natural, Artificial, or Butane Gas

•

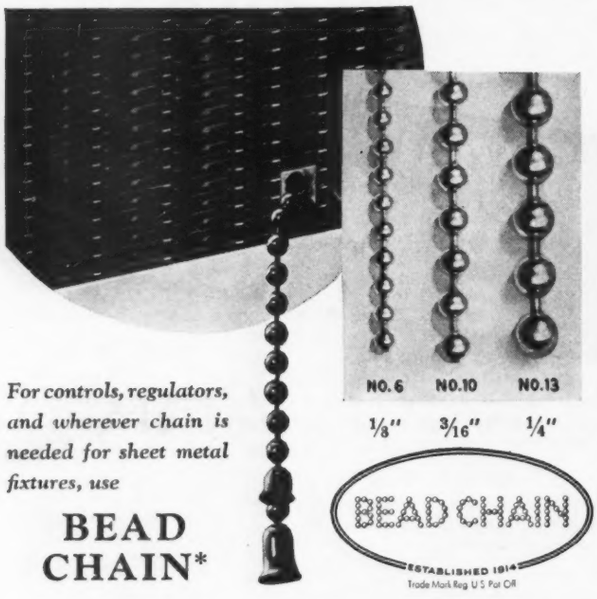
*Send for Catalog 38A—showing all types of Appliance Burners, Conversion Burners, Pressure Regulators.*

**THE BARBER GAS BURNER CO.**

**3704 Superior Ave. Cleveland, Ohio**

**BARBER *Automatic* JET GAS BURNERS**






*For controls, regulators, and wherever chain is needed for sheet metal fixtures, use*

**BEAD CHAIN***

It is smooth, non-kinkable and strong, and adds beauty to the appearance of the fixture. Made in sizes from 3/32" to 3/8" bead diameters, of which three are illustrated here. Our 25 years' experience is at the service of manufacturers in developing BEAD CHAIN* assemblies for sheet metal work.

THE BEAD CHAIN MANUFACTURING CO.

*Reg. U. S. Pat. Off. 8 MT. GROVE ST., BRIDGEPORT, CONN.


of electrolytic corrosion, particularly in coal conveyors. It should also be borne in mind that the heating system is nearly always grounded. This knowledge may serve to eliminate subsequent control difficulties, as well as possible short-circuiting during installation.

### Conclusion

In making a stoker installation it is well to bear in mind that the general purpose is to modernize the plant. Modernizing a basement implies more than merely putting in new equipment, however. It means that the finished job must be neat and attractive as well as utilitarian. The consumer usually has (or will soon have) ideas for the new uses to which basement space may be put. Therefore, every effort should be directed toward making the heating plant and its accessories unobtrusive and occupy a minimum of space.

Before turning the new burner over to its new owner it is good policy to make all necessary adjustments to the stoker from both mechanical and combustion angles. This being a subject of outstanding importance it will be discussed in a later article.

◆

## Heating Class to Meet

The class in heating, ventilating and air conditioning which opened at the Chattanooga (Tennessee) Vocational school October 16 met again October 20 and classes will be held regularly Monday and Thursday nights for the next six months. The sessions will be between 7 and 9 o'clock.


**Statement of the Ownership, Management, Circulation, Etc., Required by the Acts of Congress of August 24, 1912, and March 3, 1933**

Of American Artisan, published monthly at Chicago, Illinois, for October 1, 1939.

State of Illinois, County of Cook, ss.: Before me, a Notary Public in and for the State and county aforesaid, personally appeared F. P. Keeney, who, having been duly sworn according to law, deposes and says that he is the business manager of the American Artisan, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher, Keeney Publishing Company, Chicago, Illinois.
Editor, J. D. Wilder, Chicago, Illinois.
Managing Editor, J. D. Wilder, Chicago, Illinois.
Business Manager, F. P. Keeney, Chicago, Illinois.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.)

Keeney Publishing Company, 6 N. Michigan Ave., Chicago, Illinois. Stockholders: F. P. Keeney, Chicago, Illinois; W. J. Osborn, Fairfield, Conn.; R. Payne Wettstein, Chicago, Illinois; Chas. E. Price, Chicago, Illinois; Robert A Jack, Cleveland Heights, Ohio.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.)

None.

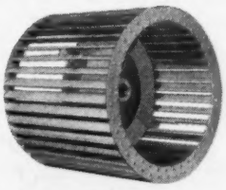
4. That the two paragraphs next above giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

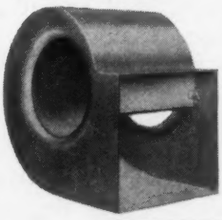
5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the twelve months preceding the date shown above is.....
(This information is required from daily publications only.)

F. P. Keeney,
Business Manager.

Sworn to and subscribed before me this 27th day of September, 1939.
(SEAL) Grace E. Waymire, Notary Public.
(My commission expires February 10, 1942.)

# BLOWER — WHEELS — HOUSINGS — ASSEMBLIES





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QUIET OPERATING
SINGLE and DOUBLE INLET
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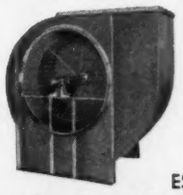


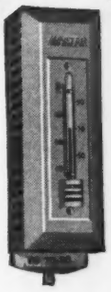
SQUIRREL CAGE, PROPELLER AND STREAMLINE FANS
AIR CONDITIONING BLOWERS
AIR WASHERS—UNIT HEATERS
FURNACE BLOWERS AND
STEAM SPECIALTIES.

ESTABLISHED IN 1879

**THE BISHOP & BABCOCK MFG. CO.**
CLEVELAND, OHIO

REPRESENTATIVES IN PRINCIPAL CITIES





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*new, improved* **MASTER**
HEAT REGULATOR

***20 Years of Research Have Produced a Control That Defies Time and Wear!***

The new, improved Master Heat Regulator is the result of over 20 years painstaking research. Every new idea, every new theory and every new principle of damper control has been carefully and thoroughly explored in our laboratories. And only the features that contribute added usefulness to the consumer, without forcing the retail price out of reasonable bounds, have been incorporated in the Master Heat Regulator. No wonder it has become the symbol of sturdiness, dependability and accuracy.

The new, improved Master Heat Regulator is recognized as the model of perfection in the heating and control industries. A product of the WHITE MANUFACTURING CO., 2362 University Avenue, St. Paul, Minn.

"BUILT TO OUTLAST ANY HEATING PLANT"



# STAR BRAND

**FOR EASIER, BETTER RIVETING**

Star Brand Rivets mean faster, smoother going on any riveting job —and assure best results.

Precision manufacture and rigid inspection insure accurate sizes and uniform quality.

Rivets are an important trifle. Use the best—Star Brand—the standard of quality for 76 years.

If your jobber or dealer can't supply you—write direct.

COPPER BRAZIERS AND TINNERS' RIVETS
ROUND, FLAT AND COUNTERSUNK HEADS
★ ALSO SPECIALS FROM
BRASS, BRONZE, NICKEL-SILVER
EVERDUR, MONEL, NICKEL
AND OTHER NON-FERROUS METALS

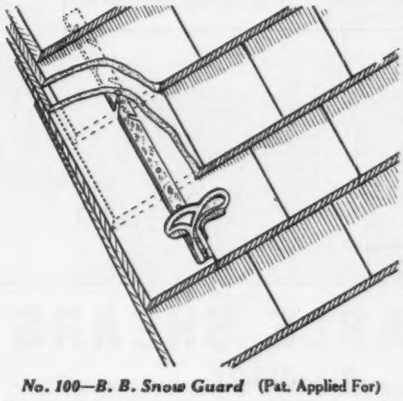
OTHER PRODUCTS
SCREW MACHINE PRODUCTS
STOVE BOLTS - MACHINE SCREWS
MACHINE SCREW NUTS
Special headed & threaded parts made from wire and rod

**BLAKE & JOHNSON CO. Est. 1849**
WATERVILLE · CONNECTICUT



# SOMETHING NEW!

## SNOW GUARD FOR OLD ROOFS



*No. 100—B. B. Snow Guard* (Pat. Applied For)

This guard was principally designed for use on old roofs, but is equally as effective on new work.

On new work, it is applied the same as other guards with plates. On roofs where the slate or shingles are already on, the operation is very simple—simply slide the slotted plate up under the slate or shingle; engage a nail, holding the slate or shingle in one of the convenient slots, pull the guard down slightly to take the benefit of the fulllength of the slot—nothing else to do.

ENDORSED BY PROMINENT SLATERS

Made of heavy stamped steel, hot galvanized after forming and solid copper. Unusual strength—ease of application—ornamental. Does not require removing of slate or shingles—no danger of breaking the slate or shingles in applying. Snow guards protect gutters, shrubbery and human life.

*Order from your jobber*

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PHILADELPHIA, PA.

16TH AND GROVE STS.,
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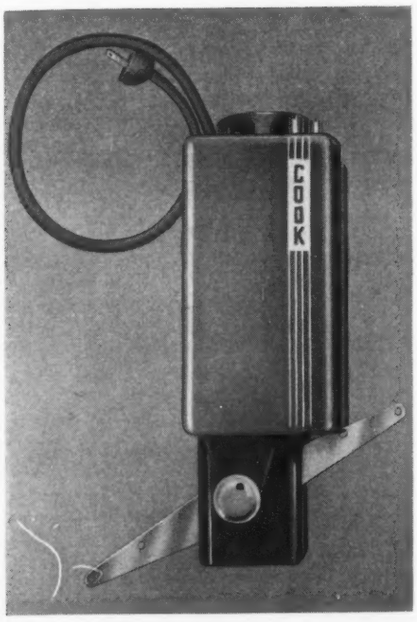


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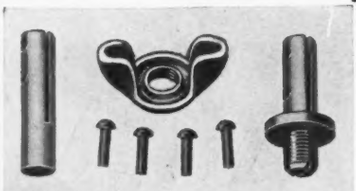

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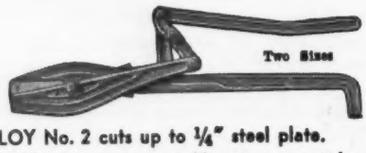


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## Konzo on Automatic Controls

(*Continued from page* 38)

should function satisfactorily are shown in the line diagrams in Fig. 5.

**Case A**—Normal intermittent operation with bonnet air temperatures at normal range. The records in Fig. 4 illustrate this normal operation. When the room thermostat demands heat (point 1) both the fan and burner begin operating (point 2), and when the room thermostat is satisfied (point 3) both fan and burner stop operating (point 4).

**Case B**—Bonnet temperature subnormal. The bonnet air temperatures may be subnormal (point 1) in extremely mild weather when there is little demand for heat, or previous to a morning "pick-up period." In the latter case the long period of burner operation (point 2) following the increase in the setting of the room thermostat is interrupted whenever the bonnet temperature exceeds a predetermined value, and no overheating occurs in the room or in the bonnet during the operation of the fan.

**Case C**—Bonnet temperatures above normal. The bonnet temperatures may be above normal (point 1) for a short period following a long "pick-up period" and after the fan shuts down. The bonnet air temperatures may also be above normal during ordinary operation if a large amount of off-period burning (point 2) should occur after the burner stops operating. When high bonnet air temperatures prevail, the heating demands are satisfied by relatively shorter periods of fan operation (point 3). Furthermore, the high-limit bonnet thermostat tends to shorten the duration of the on-period of the burner (point 4), which in turn tends to reduce the bonnet air temperatures back to normal range. The control system shown in Fig. 2 would not satisfactorily handle this situation.

**Case D**—In the case of stoker-fired furnaces, for extremely mild weather when no heating demand exists, the hold-fire time switch operates the stoker at definite time intervals in order to preserve the fire in the fuel bed. In the case of forced warm-air and gravity warm-air systems, advantage can be taken of the direct relationship that exists between the bonnet air temperature and the rate of burning during the off-periods of the stoker. By connecting the hold-fire time switch in series with the bonnet thermostat, the hold-fire time switch will operate only when the bonnet air temperature falls below a predetermined value (point 1). Hence when the bonnet air temperature is high (point 2), which is the case only when the fuel bed is fairly active and there is no danger of the fire going out, the stoker will not operate (point 3) and overheating is minimized during this period.

The automatic control system which has been described will, therefore, coordinate the operation of the burner with that of the circulating fan to provide rigid regulation of temperatures of room air, bonnet air, and flue gas at all times and under all possible conditions of service.

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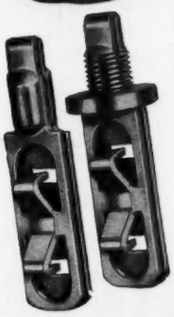

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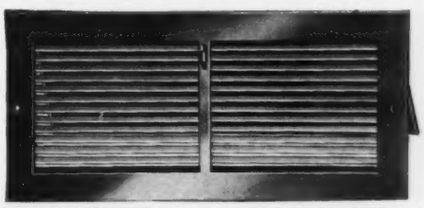

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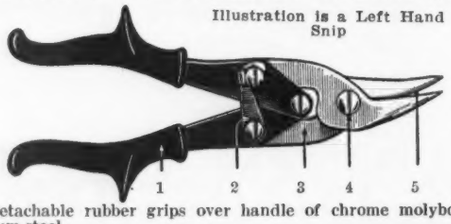


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# Building Insulation— Types and Applications

(*Continued from page* 41)

drafts. Neither do they take into account the increase in comfort conditions in the summer resulting from reduced house temperature.

### Surface Temperatures of Walls and Ceiling

Cold walls, ceilings, and glass surfaces absorb heat radiated from the human body and tend to produce a sensation of coldness. In fact, in order to maintain an equal sensation of warmth the indoor air temperature should be increased as the surface temperatures of the walls, ceiling, and glass are decreased.

The surface temperatures of the wall and ceiling facing the occupant of a room can be calculated, as shown in Appendix Section (i), for various thicknesses of

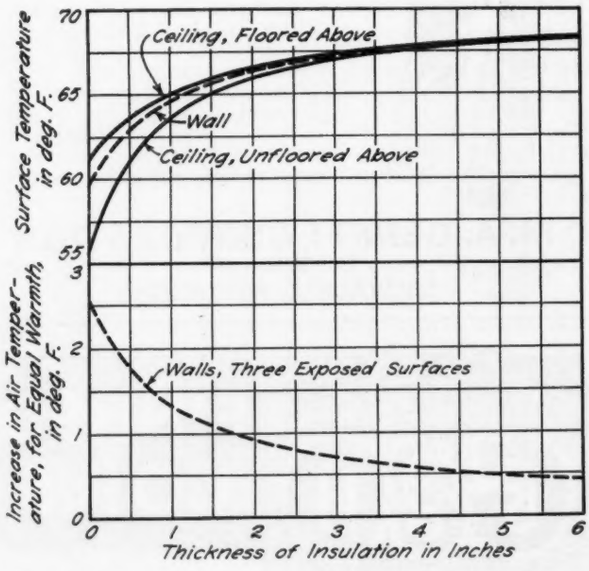


**Fig. 8—Inside Surface Temperatures of Walls and Ceiling**

insulation applied to the wall and ceiling. These calculations are based on 70 deg. F. indoor air temperature and 0 deg. F. outdoor air temperature. As shown in Fig. 8, the inner surface temperature of the uninsulated wall is 59.6 deg. F., or 10.4 deg. F. colder than the room air. The application of 2 in. of fill insulation will result in an inner surface temperature of 66.3 deg. F., or only 3.7 deg. F. colder than the room air.

Houghten and McDermott have determined from tests made at the Laboratory of the American Society of Heating and Ventilating Engineers the cooling effects of a room having three cold walls as compared with those of a room having uniform wall and air tem-

## Appendix—Equations of Heat Transmission

**(i) True Cooling Effect of Three Cold Walls.—**
The cooling effect of cold walls was determined by Houghten and McDermott[10] in the Laboratories of the A.S.H.V.E. by comparison with the sensations in a room of uniform wall and air temperatures. The values shown in Table 6 were for 70 deg. F. dry-bulb temperature in the warm-wall room, and the temperatures indicated were obtained by means of shielded thermometers.

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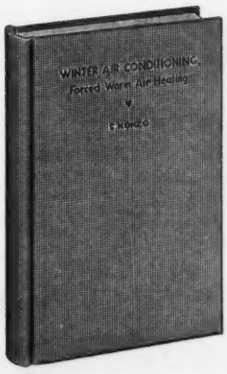


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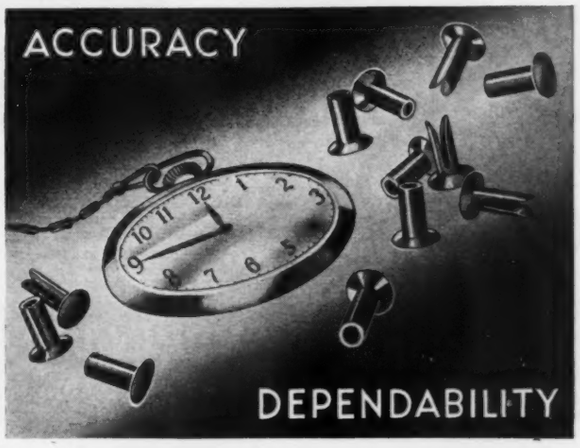


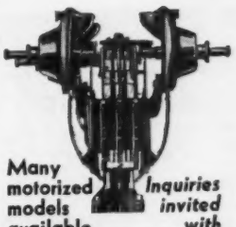

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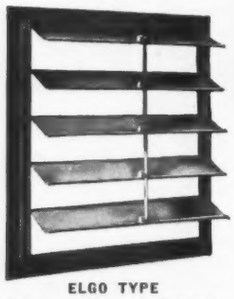
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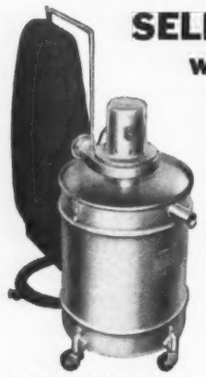
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peratures (see Appendix Section (j) and Table 6). For example, as shown in the lower part of Fig. 8, a room having three cold walls with a surface temperature of 59.6 deg. F. required an increase in air temperature of 2.6 deg. F. in order to produce the same sensation of warmth as that of a room with walls and air at a uniform temperature of 70 deg. F. The application of 2 in. of fill insulation to the wall requires an increase in air temperature of only 0.9 deg. F. Hence, for the same air temperature, a room having an adequately insulated wall will result in more comfort.

The lower surface temperatures of ceilings, both floored and unfloored above it, are also shown in the top part of Fig. 8. For all practical purposes the curve shown in the lower part of Fig. 8 may be considered as applying not only to rooms having three

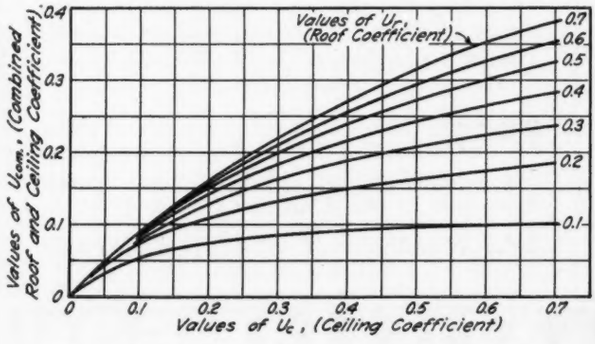


**Fig. 9—Combined Coefficients for Ceiling and Roof**

cold walls, but also to rooms having two cold walls and a cold ceiling.

Although the values shown in Fig. 8 are based on zero weather outdoors, the results also apply to a lesser extent to milder weather conditions. Since inner glass surfaces are also materially colder than the room air temperature this discussion applies equally well to the effectiveness of storm sash in increasing comfort conditions.

TABLE 4
CALCULATED VALUES FOR COMPONENTS OF COOLING LOAD

| Item No. | Source of Heat Gain | No Insulation Heat Gain B.t.u. per hr. | Used* Per Cent of Cooling Load | Assumed Insulation Used† Heat Gain, B.t.u. per hr. |
|---|---|---|---|---|
| 1 | Walls, not exposed to sun | 9080 | 24.5 | 4503 |
| 2 | Walls, exposed to sun | 3460 | 9.3 | 1384 |
| 3 | Windows, not exposed to sun | 6740 | 18.0 | 6740 |
| 4 | Windows, exposed to sun | 3120 | 8.4 | 3120 |
| 5 | Ceiling | 9050 | 24.2 | 2508 |
| 6 | Floor | —1390 | —3.7 | —1390 |
| 7 | Ventilation | 4500 | 12.0 | 4500 |
| 8 | Occupancy | 1600 | 4.3 | 1600 |
| 9 | Motors | 1200 | 3.2 | 1200 |
| 10 | Lights | 0 | 0.0 | 0 |
| | Totals | 37 360 B.t.u. per hr. | 100.0 | 24 165 B.t.u. per hr. |

Reduction = 35.3 per cent

*Assumed no insulation used (Data from U. of I. Eng. Exp. Sta. Bulletin 305)

†Assumed sufficient insulation used to reduce $U_w$ and $U_c$ to 0.1

Furthermore, the use of effective insulation and storm sash, both of which increase the inner surface temperature, will probably also result in warmer air circulating over the surfaces, and hence in warmer air in the lower part of the living zone.

**[To be continued.]**

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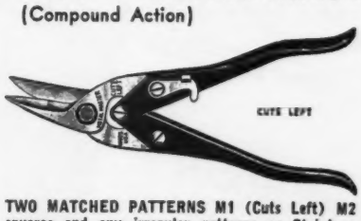


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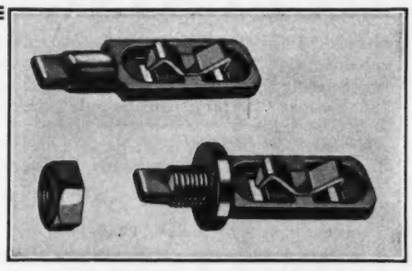

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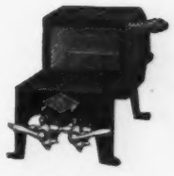

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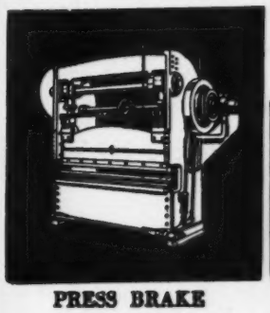

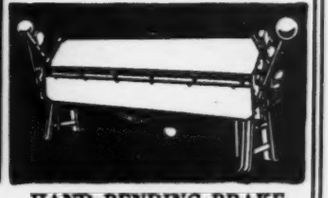

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WANTED: Manufacturer agent to handle heating dealer equipment through jobbers. State territory covered and other lines now handled. Address Key No. 477, American Artisan, 6 N. Michigan Ave., Chicago, Ill.

WANTED—Traveling Salesman to sell to dealers, complete line of warm air furnaces, for all fuels, blower units, stokers and oil burners. Must have automobile. Salary and commission basis. Address Key No. 478, American Artisan, 6 N. Michigan Ave., Chicago, Ill.

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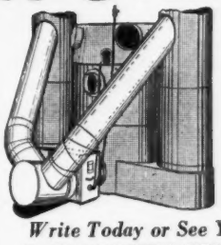

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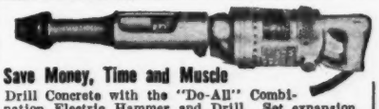

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For
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Per Sq. Ft.—Plus Boxing
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4201 Belmont Avenue Chicago, Illinois

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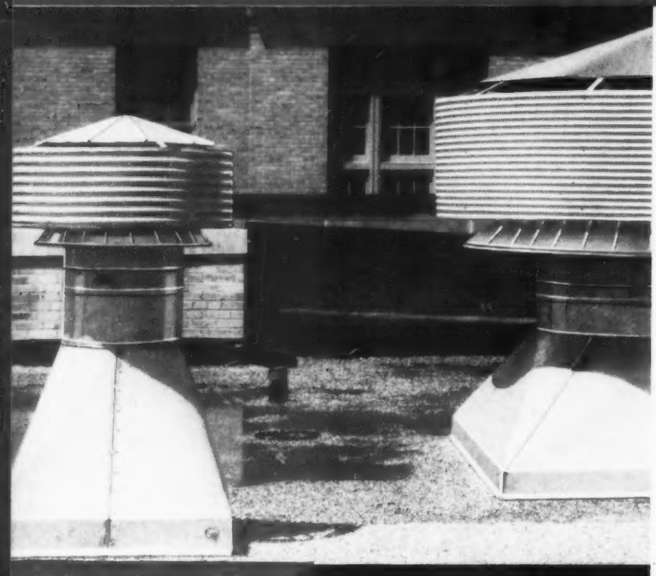
## for you on many types of building

## *with*

# MILCOR Ventilators and Skylight



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Great exhaust capacity. Simple, dependable. Rigidly strong. Does not become noisy. Alemite lubricated. Thousands of users.

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Milcor here uses the word "system" in its true sense — not to signify a limited, inflexible setup applicable only under certain conditions, but to represent so great a range of individual products, types, weights, metals, etc., that a *complete, coordinated metal backbone* can be designed to suit *any* condition of fireproof construction — all with Milcor products engineered to work together.

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